SUPPLEMENT.

The Mining Journal,

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FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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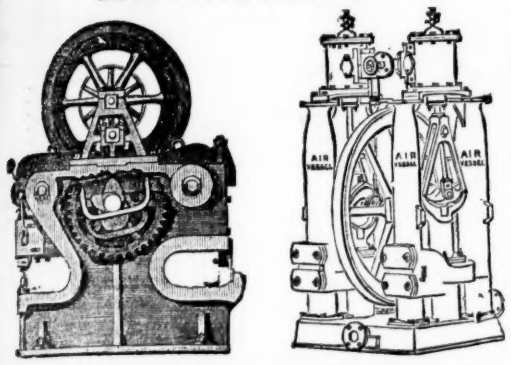

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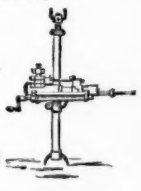

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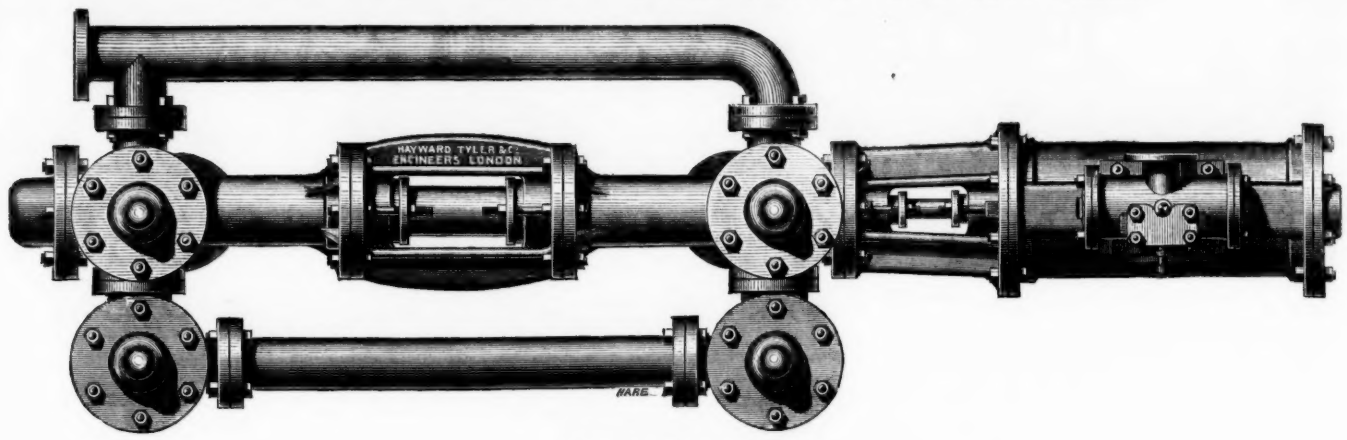

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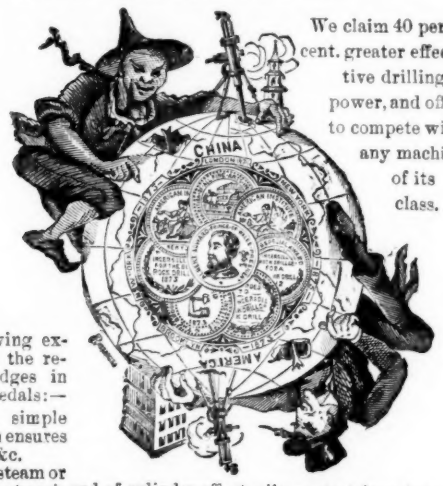

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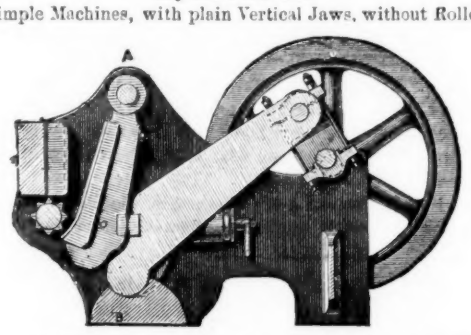

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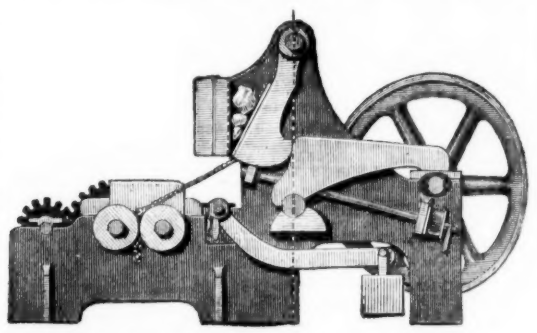

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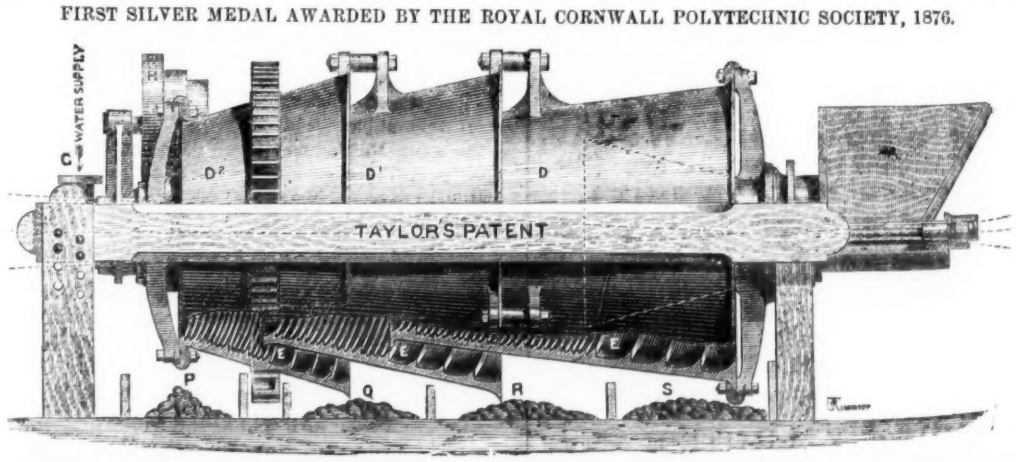

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FOR SEPARATING AND SIZING MINERAL AND OTHER SUBSTANCES.

By the aid of this invention any materials, which are of different specific gravity, can be concentrated and sorted mechanically: while in the case of ores the fine mineral is brought up with the larger particles instead of being washed into the waste—a most important feature.

This machine uses very little water in proportion to the quantity of material treated, and will be found a most useful and efficient dressing apparatus.

For further particulars, and to see machines at work, apply to the Patentee,

H. E. TAYLOR, 15, Newgate Street, Chester.

Original Correspondence.

COLLIERIES IN YORKSHIRE—CORTON WOOD.

The number of new collieries opened out in the West Riding of Yorkshire during the last four or five years has been unprecedented in the history of the coal trade. But not only has there been a great increase in the number, but in the extent and power of the most recent additions, for small concerns, such as were thought highly of a dozen years ago, could scarcely now be worked to pay expenses. An output of a couple of thousands of tons weekly from shafts 10 or 12 ft. in diameter was considered very good indeed, even where the seams were of some 6 or 8 ft. in thickness, but from similar beds a production of 1000 tons a-day at present is not considered too high an estimate, while shafts are now nearly twice as large as formerly. Other important changes have also taken place in the mode of working coal mines and in their ventilation, and, with respect to the latter, the fan is now fast superseding the furnace at old collieries, and is being adopted at most of the new ones. In fact, great changes have taken place in recent years with respect to mining and to the size of the shafts. The "Complete Collier," who wrote in the early part of the last century, mentions pits "so deep as 30, 40, or 60 fms." as something unusual, whilst the diameter of the shafts was usually about 6 ft.; but now we have collieries more than 400 fms. in depth, with shafts 20 ft. clear in diameter. The first of these very large shafts we believe was sunk two or three years ago at the Bettesfield Colliery, at Bagillt, in North Wales, the diameter being 20 ft. inside the metal tubbing. The main shaft of Corton Wood is the same in size, as is that also at Hoyland, in the same district. Such large shafts, it may be said, are only necessary where the seams of coal are of considerable thickness, or where more than one bed is being worked, for a 12 or 15 ft. shaft will generally be found sufficient to draw all the coal that can be raised from a 6 or 7 ft. seam. At the Victoria Pit, Dukinfield, at one time considered the best example of a pit in England, the diameter of the drawing shaft is 12 ft., being found quite sufficient for ¾-ton trams.

Corton Wood is situate about five miles from Barnsley, and but a short distance from Lund Hill, where in 1857 there was an explosion killing 189 persons, so that the locality is one in which the coal gives off a great deal of gas. In extent, laying out, machinery, and appliances, as well as in power of production, the colliery will be one of the finest in the entire Midland coal field. Sinking operations were commenced in October, 1873, and the Barnsley thick coal was reached at a depth of 210 yards from the surface in March, 1875, although there have been two stoppages, occupying upwards of five months altogether. Above the Barnsley seam are the—

Melton Field	4 feet thick,	40 yards deep	
Abdy Field	3	„	70 „
Kent thin coal	2	„	106 „
Kent rock coal	3	„	144 „
Barnsley	8	„	210 „

The Melton coal is a very fair one, and has been worked in several parts of the South Yorkshire district, and, no doubt, will be more extensively so when the thicker bed comes to be nearly worked out. The Abdy bed has also been partially worked, and so no doubt will the Kent thick coal, but, of course, at the present time the thick seam is, in all probability, the only one that can now be profitably worked. But the thin beds mentioned are not likely to be required at Corton Wood for a very long time indeed, seeing that the area of the field leased is about 1000 acres, that will yield something verging on a total of 12,000,000 tons of coal, whilst below the Barnsley seam is the well-known Silkstone coal, the distance between the two being from 370 to 380 yards, and to that valuable seam the most attention is now being paid by those who have nearly exhausted their leases of the thick or 9-ft. bed, as it is termed. The latter, however, contains both "hards" and "softs," adapted to meet every requirement; the day and low beds at the top and the slottings at the bottom are used together as a house and gas coal, whilst the hards are an excellent steam coal, the fine slack made being well adapted for conversion into coke. Overlying the seam is a stratum of blue metal, varying in thickness from 15 to 20 ft., whilst under it is a good bed of fire-clay 4 or 5 ft. thick. The section of the coal includes about 3 ft. 6 in. of top softs, 2 ft. 10 in. of hards, 7 in. of clay seam, and 1 ft. 10 in. of bottom softs. The coal gives off a good deal of inflammable gas, which comes out rather freely in driving places across the cleat or cleavage, the mode of working being generally long wall. As before stated, the drawing shaft is a very fine one, being fully 20 ft. in diameter inside the brickwork, which goes down some depth. It was not considered necessary to make the ventilating shaft quite so large, still it is a good one, being 15 ft. in diameter clear of the inside metal tubbing, which goes to a depth of 70 yards from the surface.

As the machinery required is of a powerful character, it may be said that the engine-house is one of the finest to be met with in the West Riding. It is 54 ft. long, 22 ft. broad, and 24 ft. high from the level of the rails. The chimney stack, which is round, is 45 yards in height and 8 ft. 6 in. in diameter inside the bricks. For the engines the beds are of the most massive and solid description, being no less than 30 ft. thick, so that there is not much probability of their being easily displaced, no matter what may take place. For drawing purposes there are a pair of 84-horse power horizontal engines, 3 ft. stroke, fitted with Bower and Qualters' patent metallic pistons, now generally adopted at the collieries and ironworks in the Midland district and Yorkshire. The engines were made by Messrs. G. and W. Garforth, of Duckinfield, Aston-under-Lyme. The boilers, of which there are to be six, will be all doubled-flued, by the Messrs. Garforth, 30 ft. long and 7 ft. in diameter. The head-gearing shows to great advantage from its elevated position, being cast-iron pillars and columns about 24 ft. high, by Qualters, Hall, and Co., of Barnsley, and another firm. The timber is of well-selected pitch pine, with pulleys 15 ft. in diameter, also by Qualters, Hall, and Co., the screens being by the same firm. For drawing the ropes are round, and made of the best wire, running on drums 15 ft. in diameter. In every draw there are four corves, each 12½ cwts., on one floor, making a total of 50 cwts. of coal at every lift. To ensure the safety of the workpeople it was arranged at first that Ormerod's patent disengaging hook, for the prevention of overwinding, should be adopted—a system which ought to be found at every colliery, for it is a most effectual safeguard against a certain description of accidents that are by no means unfrequent.

Ventilation of large collieries is one of the most important considerations the mining engineer has to study in setting out a new place. Several systems are in operation, and it is by our knowledge of the laws relating to the movements of the gases that we are enabled to come to a conclusion as to the best means for counteracting their dangerous influences. Still there is no doubt but what the greater the dimensions of the shaft the easier it will be to renew the air. The object of our mining engineers is, therefore, to obtain a uniform current of pure air all the year round by the simplest means. So far the fan has of late years been considered the best adapted for that purpose, and at Corton Wood that system has been carried out, with every prospect of its being most successful. The fan fixed upon was that known as Schiele's patent, which, amongst other advantages, occupies but little room. By it, as well as by the Guibal and some others, there is a constant and uniform current of air maintained, whilst the ventilation by the furnace cannot always be depended upon, so that neglect on the part of the man in charge of the fire may be attended with serious consequences. However, the Schiele fan put down at Corton Wood is a fine specimen of that description of work, and in every way creditable to the engineering company and Mr. Penman. The revolving disc is a solid mass of wrought-iron, 12 ft. in diameter and 25 in. in the wing. It works very smoothly and easily, and produces as much as 215,000 cubic feet of air per minute, at 185 revolutions per minute, with 2½-in. waterguage. It appears that these fans can be run to almost any speed, and, so far, have given every satisfaction. The fan is worked with a single engine, but a duplicate one is kept in case of accident. Whilst noticing the Schiele fan we may state that one is about to be put down at the colliery of Messrs. Birch, Wells, and Ryde, at Hoyland, some five miles from Barnsley, to give 250,000 cubic feet of air per minute, whilst two are in operation at the colliery of the Barrow Hematite Company, in South Yorkshire.

The surface works at Corton Wood are well laid out for economising labour and doing a very large trade, for when in full operation it is estimated that the colliery will turn out from 1200 to 1500 tons of coal daily, and so provide work for several hundreds of hands, and for their accommodation a number of houses are being erected. The sidings and top works cover about 15 acres, there being fitters, joiners, and blacksmiths' shops, and a wagon shed. As is now the case at most collieries a good deal of the stuff that is brought out is to be utilised in the making of bricks, for which there is a large drying shed capable of holding something like 100,000, with grinding machines and all the necessary appliances for turning out a very large number of bricks, for which the consumption on the premises will no doubt be large. A weighing-machine is also put down on the pit bank, with extensive and well arranged offices.

The lessors of the coal are the Earl Fitzwilliam and the trustees of Ellis's Charity, the owners being a private company of Manchester capitalists; Mr. Higson, of Manchester, is the chief engineer, and Mr. Greenhalgh the certificated manager. The working of driving out has been going on for some time, so that the production has as yet not reached anything like what it will ultimately be.

THE TIN TRADE—ENGLAND AND AUSTRALIA.

SIR,—If you think the following extract from a letter received this morning from the New England district worth noticing perhaps you will kindly insert it in next Saturday's Journal. Referring to a remark in an English paper—"that brighter days were looming in the future by the tin supplies falling off from here," the writer says—"Well, to some extent this is true. The Stanhope Copes Creek and Vegetable Creek alluvial washings are being exhausted, but against this there are hundreds of miles as yet unexplored which present all the indications favourable for equally good deposits as those already in work. These remarks only apply to alluvial deposits; when lode mining comes to the fore, which come it will, look out for discoveries to astonish the world. Why, just here there are lodes cropping up to any amount, large and well-defined, containing beautiful quartz, mica, and great stones of tin, in a fine granite formation, with traprock adjoining, cross-courses and caunter intersections—in fact, all the necessary conditions for large deposits of mineral, and also easily worked by adit levels, water for dressing purposes except stamping, which will require steam-power. There is one place here (Elsmore) particularly which shows intersections of lodes, caunters, and cross courses all full of tin cropping up to surface. A cross-cut of 30 fathoms would open these 20 fathoms deeper, and would also intersect another lode, and there are four or five lodes not far off all showing good stones of tin. All that is required is a small capital, and those who can supply it, and apply it judiciously, will reap their reward. These are indisputable facts; so with all due deference to our Cornish friend's statement, I am afraid he will have to wait a long time before his pleasing dream—any great falling off in the tin supplies from this part of the world—is realised." A MINER.

June 20.

MINING IN COLORADO—PARK COUNTY—No. IV.

SIR,—My last article closed with a brief description of the Great Moose Silver Mine, on Mont Bross. At about the same elevation, and only one-third of a mile distant to the east, is the Dolly Varden. Like the Moose, it is very extensive; its peculiar geological feature is the presence of a dyke of trachyte, that runs through the property. In contact, or in immediate proximity with it, the silver-bearing limestones are exceedingly rich. The ore consists of lead, magnetite, the sulpherets and carbonates of copper, a little zinc-blende and iron pyrites, in a gangue of sulphate of baryta and lime. Little veins of bright crystalline calcite occur in a reticulated form; strings of black sulphate of silver, also sulphides, are found in a similar manner. These are very rich, but the quantity is small; generally the deposits are of an irregular angular shape, being produced by the action of local adverse slides. They are called pockets, and although not positively continuous, yet there is an apparent connection one with the other, which can be traced by a close examination of the heading and lateral joints of the stratum. Some of these pockets have produced 1000 tons of ore, and there is one now working that I think will greatly exceed this. There are no lodes in the mines, consequently it is very difficult to arrive at an estimate of value. The ore is sampled under four classes, each of which give the following produce in silver:—First class, from 250 to 400 ozs.; second class may be taken at an average of 175 ozs.; third class at from 50 to 80 ozs.; and the fourth class from 20 to 40 ozs. The present price of silver here is $1·20, equal to 5s. per ounce. In the sale of this ore to the local smelting-houses nothing whatever is paid for the lead, and very little for either the copper or the gold it may contain—a circumstance that operates much to the disadvantage of the miners, for in many instances the baser metals the ore contains are worth one-third that of the precious. It is to be hoped this heavy loss will soon be remedied, as there are several reduction works on the "humid process" about being erected in the district. The accumulation of low-grade silver ores in all these mines is enormous: 100,000 tons to-day can be seen that will assay over 25 ozs. of silver, and which is perfectly useless until a market can be found.

The Hiawatha Mine, a very extensive property, adjoins the Dolly Varden; it belongs to the Park Pool Association, and is valued at a high figure. They made a dividend of 50 per cent. the first year and 75 per cent. the second year of active operations. This mine alone could keep a very large reduction-works running. The ores are of medium grade, but very abundant. Being a private company of about six partners, they do not seem to care to operate on a large scale; but there is ample scope for the employment of 150 to 200 men. There are streaks of mineral here very rich; I have specimens by me exceeding 1000 ozs. of silver to the ton. The average, I think, may be taken at about 100 ozs.

The Snow Bird, Silver Gem, Guinea Pig, and Milwaukee are smaller mines, all on the same part of the mountain; each have entered into courses of ore of greater or less extent, and of good quality.

The great Mont Bross tunnel is the largest enterprise ever undertaken in this county. It will be nearly 2 miles in length, and attain a depth of 2700 ft. when under the highest part of the Dolly Varden Mine. It commences in a little park or plateau, that was at one time the site of a foot-hill lake, of about 40 acres in area. From what I can see of the rocks that are exposed I think the formation is about the junction of the Lower Devonian with the Upper Silurian. The detritus is very deep all along here, making it very difficult to define a line of demarcation. The chief object is to cut through a number of lodes that are known to exist and crossing its course, and eventually get under the Dolly Varden and Hiawatha Mines, which when effected will not only become a permanent source of drainage, but an outlet to all their produce, and reduce the present cost of transportation, which is about $4 a ton, down to about 50 c., but the advantage does not stop here. At the entrance of the tunnel will be erected concentrating and humid reduction works on a large scale—so that everything that comes out of the tunnel of marketable value can be utilised and made profitable; and from what can be seen at surface of some of the gold and copper bearing lodes that will be struck within the first 700 ft. of the tunnel, the produce manipulated will materially aid in furnishing funds for its entire construction. Now, the Tunnel Law of Colorado grants to tunnel companies the right to claim 1500 ft. in length by 300 ft. in width, on all lodes they may discover in their explorations; therefore, in a work of this magnitude in a few years the accumulation of mineral property will be enormous, in all probability amounting to millions in value. In a scientific point of view it is exceedingly interesting, and will throw more practical light on the geology of this portion of the snowy range of the Rocky Mountains than anything heretofore attempted on this side. It is the enterprise of Messrs. Hall, Brunk, and associates, all extensive mine-owners and all pioneers of mineral development. To some of this party may be accredited the honour of first publishing through the Press the real or true exposition of the mineral values of these mountains *pro et con.*

I have not yet made any underground survey of the somewhat singular property the Security Mine; and, therefore, what I may say or what I do know of it must be taken as quite provisionally. It is on the eastern slope of Mont Bross, and near the ravine known as Buckskin Creek, a somewhat celebrated locality a few years ago as the scene of early placer mining, and from whence heavy returns were made in free gold, and the diggings of which subsequently led to the foundation of the town of Alma. The Security Mine is to all appearance a surface deposit, but in a very peculiar shape. The ore, which consists of iron and copper pyrites, slightly speckled with lead, and carrying from 1½ to 4 ozs. of gold, with 36 ozs. of silver, and about 10 per cent. of copper, lies embedded in a breccia of limestone and disintegrated eruptive rocks of the Devonian era, the source of which has been pointed out in former papers. The deposit is not over 50 ft. in width as thus far known, and from 3 to 10 ft. thick. It is a very profitable mine, the cost of extraction not exceeding $8 per ton. This ore, being an excellent fluxing material, apart from the gold it contains, finds a ready sale at the Alma Smelting Works, and I hear no complaint from the mine-owners at the price they obtain for it.

My next article on Park County will give some information on Buckskin and Mosquito Creeks, and the celebrated gold and silver mine known as the Queen of the Hills, in the neighbourhood of the London Mine, an extensive property belonging to some gentlemen in Scotland. CHARLES S. RICHARDSON, C.M.E.

Alma Museum, Alma Park, County Colorado, May 28.

NORTH AMERICA GOLD MINING COMPANY.

SIR,—Certainly the yearly report on the affairs of this company are inexplicable. The property is now leased, and last year yielded in bullion 19,687*l.* 2s. 3d., which was said to have been expended in the following extraordinary way:—Labour, 10,063*l.* 15s. 5d.; general expenses, 2192*l.* 13s. 6d.; three-fourths profit to lessee of mine, 5573*l.*; and one-fourth profit to English company, 1857*l.* 13s. 4d. The expenses, as above, are 12,256*l.* 8s. 11d., or about 62½ per cent. on the yield. In California the usual and outside calculation for expenses in such diggings is 33⅓ per cent. The excuse given for the largeness of last year's yield is the washing of the tailings, which, to use words of the report, "proved, as was anticipated, exceedingly rich." Query—Why were not these tailings washed for the benefit of the company, instead of for the lessees, or after granting a lease? It was always stated they were rich. Another query—In California it is considered a fair calculation that about 10 per cent. of the yield of gold gets away in the tailings; therefore, the question arises—what became of the gold at the first washing? For if the tailings wash out 19,687*l.* 2s. 3d., the original gravel ought to have contained something like 196,871*l.* 2s. 6d.; perhaps there was no first washing! Californian and Australian miners say rich tailings cannot be found without rich gravel in the first place, which certainly appears commonsense. SUFFERER.

MINING IN THE EAST—No. XIV.

CONTACT DEPOSITS OF THE BANAT.

SIR,—It would be difficult to find a country whose metalliferous deposits present so much interest to the intelligent miner, and which at the same time has given so much food for reflection to the geologist, as that situate between the golden bearing sands of the Maros river to the north, and the Danube to the south, whose waters in this portion of its course are confined to a ravine dominated by noble lime rock crags, which often attain a height of 2000 ft. on both banks. For centuries the deep contracted dells which serpentine from the mountains to the tertiary Hungarian basin have intermittently re-echoed to the sounds of human industry, intermittent because devastating wars have again and again destroyed industrial communities. The riches obtained from the mines of this district in ancient times must certainly have been great if determined by the innumerable remains of excavations which invariably accompany the mineral-bearing strata.

From want of reliable information it is not possible to decide if the various mining fields have been exhausted of their metallic contents. The few mines which the State Railways Company worked for some years were yielding good ores, when the difficulty of raising the water by hand pumping finally deciding the closing of all the deeper mines, though many of them were actually making some profit. The large railway interest which this company possesses in the Austro-Hungarian Empire, and in which a capital equal to that of the London and North-Western has been invested, no doubt induced the direction to gradually neglect their mines of copper and lead, and devote their resources to the opening of the coal mines of Stierdorf and Sécul, in order to fully develope the iron and steel industries of Rechitza and Anina, which have given an annually increasing production until they have risen to be the largest establishments in Hungary.

The unfailing supplies of copper, silver, gold, iron, and other metals, which for generations have been drawn from the mines of the Banater Domain, are the useful products of true contact deposits of an unique character. Occurring at the junction of hypogene rocks with calcareous strata, they were presumedly elaborated during the eocene period, whilst the transformations which they have subsequently endured have taken place in recent times—i.e., after their exposure to surface reactions. These shallow deposits of ores are worthy of being placed before the mining public, both because a careful study of them must lead to a simpler conception of the conditions under which metallic matter may be segregated, and because numerous collections of ores, similar in their mode of occurrence, are known to be scattered over widespread regions of Europe and Asia, rarely exploited, and the value of which are not recognised. Many apocryphal stories of the wonderful riches of the ancient mines of Asia Minor and the Turko-Sclavish provinces have been related.

Throughout these countries the upheaval of eruptive rocks, analogous in character to the Banatite, has disrupted the sedimentary beds, but as far as generally known deposits of minerals have only been found valuable where the syenitic rocks have forced themselves into intimate connection with the calcic strata. The deposits are usually found with facility, because of their being usually covered with immense masses of gossan, the result of the peroxidation of the original pyrites. Many of these caps of hematite are rich in iron, and are smelted at the numerous ironworks into pigs of excellent quality. It may with much justness be remarked that such deposits are only superficial, and can never make deep mines; this is so far true that the mines have rarely been explored to a depth exceeding 100 fms., but then it must not be forgotten that the mineral is found under the sod with small cost of prospecting, so that the costly preparatory works of vein mining become unnecessary. Again, the configuration of the surface admits of the easy drainage of the mines by deep adits from the valleys of erosion circling around the mineral bearing strata, which, prone to decompose, are rapidly disintegrated and carried away by the heavy rains which the demi-nude mountains of limerock determine, whilst the deposits themselves, protected by the crystalline limestone, and by the durable *eiserne Hut*, stand prominently forth. The comparatively small capital required to open such mines, combined with the facility and inexpensive arrangements by which they can be economically worked by means of deep adits, make these deposits eminently suitable to a country like Hungary, whose inhabitants are not possessed of large capital, and who have neither that steady faith nor endurance of purpose so imperatively necessary to ensure the success of deep mining.

Nearly all the mines included in the four metalliferous districts of the Banat—Dognacska, Oravitza, Szaszka, and Moldova—produce cupriferous pyrites under the superficial masses of ferruginous oxides. Very rarely mines of lead ores, containing a small percentage of the precious metals, have been worked, and more rarely still mines of gold. In former days, and until within the last few years, the deposits were ransacked for copper ores, and many rich courses were found following the faces of the displaced masses of limerock. Many of the normal accumulations of sulphide of iron appear to have been poor in copper, and these have been rendered exploitable by the accumulation of oxides and carbonates, due to the continual oxidation of the pyrites. The adits which have been driven into such deposits are continually removing in these drainage waters salts of copper and iron.

The mineral wealth of the Banater Domain is rendered so conspi-

cuous by the masses of gossan, which, wherever seen, indicate unerringly the position of the useful metals, that it is somewhat surprising that any of the deposits have remained for the miners of the present century. Still it must be frankly acknowledged that many of the most important mines, both in the Banat and Servia, may be considered as exhausted, though still struggling hard against suspension. There are not many of the copper mines which would repay the outlay of re-opening them, and these districts will not for the future depend on their iron ores which so abundantly exist. In the provinces south of the Danube the unsettled state of the populations has not permitted for centuries the development of mining or smelting industries, and the condition of Asia Minor since the decline of the Eastern Latin Empire has prohibited all speculative enterprise.

Many of these countries, and especially Bosnia, possess a reputation for undeveloped mineral wealth, and it may be unhesitatingly affirmed that the prospecting of these virgin mineral fields by one versed in the manner of occurrence of the deposits would most assuredly be rewarded by the discovery of valuable deposits, which, could reasonable concessions be procured, would, with a moderate expenditure of capital, lead to most satisfactory returns.

In the mineral districts about to be described nearly all the mines, together with the many smelting establishments employed in the reduction of the ores, appertain to the States Railway Company, who are also the lessees of all the buildings, and of 320,000 acres of forest and meadow lands. EMPRESSARIO.

ARTIFICIAL FUEL.

SIR,—I read in last week's Journal an account of Mr. Mallee's artificial fuel. When ready for sale (notice of which, I hope, will appear in the Journal), I shall be glad to make a trial, for if it will fulfil the objects mentioned it must come into extensive use, if reasonable in price, for the various new cooking stoves brought into use of late years, and also supersede the gas stoves. I shall try it for both the above, having one of each. W. GIGNEY.

Jerusalem Coffee House, June 19.

THE EXCHEQUER MINE—VALUE OF THE ORE.

SIR,—The main point to ascertain in the present critical position of the Exchequer Mine is, what is really the average value of our ore? The reported result of $4 a ton as given by the O'Hara furnace would be well nigh fatal to any hopes of success, as well as an overwhelming disappointment to all at home, directors as well as shareholders, especially after the flaming reports of rich and valuable discoveries so persistently sent home by the manager at the mine. Assays ranging from 70*l.* to 170*l.* a ton, on many samples variously taken, justified us in thinking our mine an ascertained success, and I for one trust the directors will not accept, too readily, the O'Hara result of under 1*l.* It does not simply appear credible that all these previous assays can have been unfaithfully given, or all taken from a very few isolated specimens. No time should, therefore, be lost in clearing up this matter, as, if our ore was anything near what we have been hitherto assured it was, a good furnace may yet bring us all round. Now, it appears to me that we have already one clue towards ascertaining the reliance to be placed on the O'Hara results; and I would, through the Journal, ask of the directors the following questions, which the several reports of the manager ought to enable them to answer.

1.—How many days did the old furnace work in 1876 before it broke down?

2.—How many tons of ore were treated during the time, and were they of picked or average ore?

The result being (as we were told at the recent meeting) the 368*l.* 5s. 4d. which figures in the balance-sheet; answers to these two questions would soon show us if we ought to sit quiet under the O'Hara furnace with its $4 a ton, or whether we ought not rather to throw it over at once as an audacious impostor.

London, June 20. A STILL SANGUINE SHAREHOLDER.

EXCHEQUER GOLD AND SILVER MINING COMPANY.

SIR,—In your report of the meeting of the shareholders of this company, held on the 12th inst., I am made to "ask whether it was not a fact that this class of mine did not yield good ore at a depth of 600 ft., which might be looked upon as a shallow depth, and was it not a fact that true fissure veins in the porphyritic formation seldom yielded a large quantity of rich ore at a depth so shallow as 400 ft.?" This is so unlike what I said as to be calculated to produce an utterly false impression of it. I asked—"Is there any foundation whatever for the statement made in the Chairman's circular 'that true fissure mines in a porphyritic formation seldom yield any large quantity of rich ore at a depth so shallow as 400 ft., as instanced by our not very remote neighbours on the Comstock lode?'" These were my exact words, and I was quoting from the circular referred to, and which I held in my hand and read from. I added that what I wished to know was whether there was any authority for the idea that depth had anything to do with it, and whether the Comstock was a legitimate precedent to refer to, or words to that effect.

Mr. Sewell replied to the effect that it was because our ore was ruby silver ore—or, in other words, because it contains antimony—that greater depth was required, which, as I remarked, was tantamount to saying that the Comstock lode is not, in this respect, a parallel case, inasmuch as the Comstock lode contains, I believe, little or no antimony. The fact that the Comstock is not an exact parallel is in one sense fortunate for us; for, as I also pointed out later on, more than half the bonanzas discovered in that lode are within 100 ft. of the surface, and had furnished dividends of upwards of $15,000,000 up to June 1, 1875, the Gould and Curry alone having paid $3,826,000 in dividends from a bonanza which actually cropped out at the surface. (And this in spite of the wasteful and extravagant manner in which those mines had been worked.) The total amount of dividends paid by the mines on the Comstock up to that date appears to have been $53,118,500, including $7,560,000 paid by the Consolidated Virginia, $11,588,000 by the Crown Point, and $14,135,000 by the Belcher, the last two between them striking four large bonanzas, of which the largest and deepest lies about 800 ft. below the surface.

On the other hand, the Gould and Curry, after paying nearly $4,000,000 in dividends from a surface bonanza, had sunk about 1800 ft., and spent $1,532,000, without striking another; the Savage, after paying $4,460,000 from bonanzas, the deepest of which came within 400 ft. of the surface, had sunk upwards of 2000 ft., and spent $1,994,000, without finding anything more. And so it has been with the Chollar Potosi and others.

I do not understand Mr. Sewell's application of the term "denudation" to an almost vertical fissure vein. It certainly cannot apply in the usual sense of the term, as used by geologists. And, as a matter of fact, we know that our surface ore has not been "carried away by denundation," or any other means; for we found ore at the very surface, and all the way down, some *rich* ore having been actually stoped within 60 ft. of the surface, and 120 ft. above the level of the hoisting floor, and milled. Perhaps Mr. Sewell, or some other of your readers, can enlighten me. ALGERNON JOY.

Junior United Service Club, St. James's, S.W., June 22.

NEW QUEBRADA MINING COMPANY.

SIR,—Having met with an old shareholder in this property I promised to write a few lines respecting it. I was extremely glad to find that the directors, in presenting their report, had expressed the right views concerning the mines. The vein of Aroa is, by the accounts I received from my late uncle, Capt. Wm. Francis, and my late brother Matthew—the former of whom held the management of the mines for six and the latter for three years—the richest copper vein ever worked on, and that this will prove to be true I have not a shadow of a doubt on my mind. By the geological plans and sections of the estates prepared by them, and which I now hold, I find that the ore was then smelted on the spot, as the smelting-houses are marked on the plan. If, therefore, the same system is now adopted it seems an act of folly to send ore containing 20 per cent. of copper over a long land carriage, and then 4000 miles by sea. When the Aroa vein shall have been properly proved and laid open, it will effect a saving of 100,000*l.* per year, and the directors and shareholders should lose no time in attending to this, which would make it the best copper property in the world.

Goginan, June 20. ABSALOM FRANCIS.

ECONOMIC PORTABLE RAILWAY FOR MINES.

SIR,—I should feel obliged if some reader would inform me where I can obtain information respecting the Economic Portable Railway for Mines, on the Decauville system, described in the Supplement to the *Mining Journal* of June 16 (p. 661), and whether any lines constructed on this plan are in actual operation in this country, and can be seen in action. I should be glad to know whether they are strong enough for long and continuous use in bringing down ores in large quantities from the mines to the coast (a distance of four or five miles), and whether they will bear a long string of trucks and a small locomotive. W. F. S.

June 21.

GREAT WESTERN RAILWAY.

SIR,—You are, "I guess," informed of the fact that the Great Western Railway Company have agreed with the Cornwall Minerals Railway Company to take a lease of their line, and to work it in connection with the Cornwall Railway, at a rental of, I believe, 15,000*l.* per annum. The Chairman estimates that to begin there will be a loss of about 4000*l.* per annum by such renting, but he thought it better to sustain a temporary loss than to allow the line to get into the hands of the London and South-Western Company. I regret that the last-named company did not take the line, because it is well known that that company is more liberal than the Great Western to the travelling community. It is true that at present the South-Western Company have no connecting link so as to work it in conjunction with their system, and doubtless that accounts for their non-competition for the line. Although just now the receipts are small on the Minerals line, there is a probability that the traffic in iron ores which are expected from the Perran Mines will be so large as to obviate a loss on the working at the expressed rent. The Perran iron lode is said to be practically inexhaustible, and it is now being worked at several points by a large force under the direction of Mr. Henderson and three sub-agents. There was an advertisement in the local newspapers for three agents, and it was answered by more than 100 applicants, which shows that the abandonment of our tin mines have thrown out, as a matter of course, a large number of agents.

There can be no doubt that the Great Western Company can work the Minerals Railway more economically than it is worked now. I hope that there will be a junction of the two railways between the two Par Stations, the distance being only about one-third of a mile, which would safe the cost and trouble of the carriage of goods and passengers from one station to the other. It is to be hoped also that the Great Western Company will open the line to Newquay from Burngullow Station, so that Western passengers may not have to go so far round as Par in order to reach Newquay. Truro to Newquay direct by common road is about 15 miles, but by the railway via Par the distance is about 38 miles, a difference of about 23 miles. But via Burngullow the difference would be only about 8 or 10 miles—*i.e.*, in excess of the distance on the common road. There is an enormous quantity of china-clay carried over the Minerals Railway, and the traffic in that article is progressive. I am of opinion, therefore, that the Great Western Company have not made a bad bargain, looking at the prospects before them.

It is remarkable that the Great Western Company have not completed the station at Truro; there is a portion (about 80 ft. in length by about 40 ft. in width) unroofed. I spoke to an official about it, who told me that the company could not afford the expense. Of course, I took it as a joke. During rain the platform is drenched, and the passengers somewhat exposed to the weather. R. S.

Truro, June 14.

STREET TRAMWAY ENGINES.

SIR,—Although several foreign countries appear now to have the advantage of steam traction on their street tramways, there does not appear to be any attempt worthy of the name being made to facilitate the adoption of steam in the London suburbs, which is the more remarkable as I believe that it is principally English money that has been employed to supply the machines already at work. The delay may, perhaps, have arisen through the long existing prejudices that has to be overcome from the general feeling that exists that steam cannot be brought so fully under control as horses. Than this nothing can, in my opinion, be more erroneous. We all know that in the old days of coaching a driver behind a good team had no hesitation in averaging 10 miles an hour, including stoppages, and at many parts of the road a few miles gallop at 12 miles an hour was not objected to. Now, the maximum speed of tramcars propelled by steam might be fixed at eight miles an hour, and at that rate the car could, I am convinced, be brought to a dead stand in a shorter distance than would be possible with a coach and four going at the same speed.

With regard to the engine that could be employed, there are two distinct classes, and no doubt each has something to recommend it. These two systems are the combined and the separate engine systems—that is, the principle of making the propelling arrangement part of the tramcar itself, and that for drawing the car by a distinct engine, just as a locomotive draws a train. In both cases the chief difficulties which formed vallid objections against steam traction when it was proposed some years ago have been removed, for the engines are now made to work both noiselessly and without smoke, so that the choice is reduced to a matter of convenience and economy. The combined system avoids the cost of separate carrying arrangements for the engine, but this appears to me to be about the only advantage, whilst the disadvantages are very great. It is necessary to place the boiler on the top, or on the end platform, for the driver must be able to see his road from a central point on the line, which, with the engine in the centre of the tramcar, would be impossible. Now, with the driver on the centre of the roof it would be somewhat difficult to get such a full view of the line close in front of the car as would ensure freedom from accident. If this view be correct the engine would almost necessarily be placed on the front platform, and the result would be that at the end of each journey the car would have to be turned bodily round, necessitating the use of turn-tables, which are both expensive and troublesome. But perhaps the greatest objection to the combined system is the annoyance which it would cause to passengers by the vibration, which would be inevitable if the car wheels were used as propelling wheels. Taking, therefore, the whole of the circumstances connected with the combined system, I believe that it would make the trams unpopular, and speedily lead to the abandonment of steam on tram lines altogether.

The separate system does not seem to possess one of the disadvantages just mentioned, although there may, of course, be others which I have not observed; these I should be glad if any correspondent will point out, as I feel confident that there are none which could not be easily remedied. The little engine of Merryweather appears to me to be very nearly perfect, and as it is no longer than a horse no objection could be raised as to its producing an additional obstruction. The driver has a full view of the road from a convenient position, and when running at eight miles an hour it could be stopped as short as by pulling a horse on his haunches, and considerably quicker than would be possible with the cars running as at present. No turning of either car or engine would be necessary at the end of each journey, as the engine would simply be detached, removed to the other end by an ordinary pass by, such as is now commonly used where single lines are necessary, re-attached, and started on the return journey. The vibration of the other system would be entirely avoided, and the travelling would be smooth and pleasant, whilst the journey would be performed in from one-half to two-thirds the time now occupied.

The great thing necessary to secure absolute safety with steam worked tramways is a thoroughly efficient brake—one that will act rapidly, and yet without shock. There are almost innumerable brakes that would pull up a tram car in 20 or 30 inches, but with these all the passengers would be driven together without some modification were made. There are also brakes which will stop without shock, but these are too slow in action. The best brake for the purpose which I have seen is one invented, I believe, by an American. A small supplemental wheel is fixed so as to be rotated by the periphery of each bearing wheel, but not to touch the line. To stop the vehicle the supplementary wheels are lowered on to the line; and as each bearing wheel is running the supplementary wheel in the reverse direction, there are four wheels running each way, and the stoppage is almost instantaneous.

June 18. H. K. C.

GOLD IN MERIONETHSHIRE—CLOGAU GOLD MINE.

SIR,—After giving the details of the Berdan pans and the Britten pans, I should like to show how those pans are working. In June, 1861, there was at the Clogau Gold Mine one of Berdan's machines, and two Britten pans, and they crushed 32 tons 4 cwts., and it realised 142 ozs. 12 dwts., valued at 3*l.* 18s. per ounce. One of Berdan's machines cost at that time 500*l.* The machine consists of a pan and ball, weighing 3 tons each. The pan turns 18 times a minute, and as it turns the ball naturally turns in it. The stuff is thrown in in lumps, and the ball crushes it as it turns; then the gold mixes with the quicksilver in the pan, the quartz mixes with the water and gets into slime; then letting fresh water in washes the slime from the pan; then leaves the gold and quicksilver amalgamated in the pan, so that it saves the gold from being washed away, and it is an undoubted fact that Berdan's machines are the only safe process for the Welsh quartz, and, further, that the above machine has turned more gold than any mine in the Principality, and every other process has been worthless during the lapse of those years. In concluding, I merely wish to say for the benefit of the public at large that the above process ought to be used.

Dolgelly, June 20. OLD MINER.

MINING IN THE HALKIN DISTRICT.

SIR,—During a tour through the above district I visited three or four mines. The first was a young mine (close to the celebrated Hendre Wood), worked by a private party; this is a good paying concern at present, and likely to make large returns. The second mine I went to was the North Hendre, which is worked by a limited company, and has paid about 14,000*l.* in dividends; the usual returns were from 35 to 40 tons per month, but now they sell 100 tons per month. They had a splendid pile of ore at surface. The third place we went to was the Pant-yr-rhes Mine; this is worked by a private party. They have sunk a trial shaft from surface, and struck into the lode, which is of the most promising character, and yielding nice saving stuff. The ground is of the same character as they have at North Hendre, and I have no hesitation in saying that this mine will rank among the best of the district. The next we went to was the Prince Patrick Mine, which is worked by a limited company, and has paid about 12,000*l.* in dividends. The present returns are about 20 tons per month, but I understand they have made a new discovery, and are likely to be able to increase the returns. I think more attention will be paid to this district before long, as there are many mines which are likely to make large returns.

Conway, June 19. TOURIST.

THE MINING DISTRICT OF LLANRWST.

SIR,—Reading in last week's Journal a very interesting account of the above district by my *compagnon de voyage*, I thought it might interest some of your readers if I this week added a few words, not exactly for the sake of confirmation, as that would be a work of supererogation (the writer of the article being so well known), but to give my impression of the value of the lodes in the Clementina Mine inspected by me. Entering the mine at the adit level, some little distance below the site of the present water-wheel and dressing-floors, Capt. Roberts acted as guide to the shaft, which we descended by ladders to the 25 level. The lode in the south end of this level is valued at 1 ton of lead per fathom, with a little blende; the rise above the end is equally rich, and in a few days may be holed to the winze from the 15 level. This winze has water in it, so that I could not see the lode there, but the last workers, when driven from it by the water, are said to have left a good lode for lead in the bottom, a statement which is pretty well proved by the lode I saw in the rise beneath it. Returning, we were lowered to the bottom of the shaft now in course of sinking to open out a fresh level at 35 fms. from adit, which depth will be reached in the course of two or three weeks. The lode here is of very similar appearance and value to that in the level above, with this important difference, that as they gain in depth the miners say the country gets softer, from which a further improvement may be expected. But taking the lode at its present value only, I think that when the next level is opened out and stoping commenced sufficient lead can be raised to pay a handsome dividend upon the capital, and we have every reason to expect the lode will improve still more at deeper levels, sinking for which will be resumed so soon as the men are out of the way in the 35. An important point mentioned in last week's article I have not yet referred to—the east and west lode; this is about 4 fms. from the shaft, so that only a short time will be required to intersect it, and the importance of this lode is great, for it will at once give us two additional ends and stoping ground to the 25 to work upon. Capt. Bennett estimates that he will soon be in a position to commence sales, beginning at 20 tons of lead per month, which I need not say will be a great thing for so young a company, but more especially for one with a capital of only 2500*l.* Why, it would be no difficult matter, with the lodes we have, to return the capital in twelve months. Upon a future visit I hope to inspect the workings in the D'Eresby Mountain Mine, which I shall be happy to give your readers an account of. Those who have not seen the graphic description of the Llanrwst district before referred to I would advise to procure your Journal of June 16.

HENRY WM. LAMB.

PS.—I may add that there is already 200*l.* worth of lead broken at the mine by the present company.

TIN DRESSING.

SIR,—You will probably remember that a few weeks ago a paper was read at Camborne by a member of the Cornwall Mining Institute on Tin Dressing. After the address, in the course of a discussion, references were made to the various buddles in use, and the lecturer, without knowing the merits of the buddle invented by Mr. R. H. Williams, civil and mining engineer, and in use at Wheal Eliza and other mines belonging to him, said that it did not deserve the name of a buddle. Being in the neighbourhood to-day, I took occasion, with Mr. Williams's kind permission, to investigate all the machinery on the mine, and amongst the rest all the buddles, and I am justified in alleging that for simplicity and effect it is the most perfect of all the buddles I have seen, and I have seen every sort used in this county. I caused a van to be taken near the circumference of the buddle. The separation was so perfect that I could not find a particle of tin in the shovel. It is, therefore, not surprising that Thomas Trezise, who expended several hundreds of pounds in the construction of works on the stream leading from the mines to Par estuary, should have lost nearly all his money, and become bankrupt. After nearly three years labour, all the tin he collected did not amount to 6 cwts. Before he commenced the works he visited the Red River, and took all the instruction that he could derive from the numerous contrivances there. The tin at Wheal Eliza is very like that at Dolcoath—some of it being so very light as to float down the stream, unless detained as it is at Wheal Eliza. However confident Capt. Teague and the other managers of the mines adjacent to the Red River may be in the capabilities of their machinery for securing the tin, they would show wisdom by adopting Mr. Williams's buddle, and thereby save the fine tin from being carried down the Red River into the Bristol Channel, as a good deal of it does despite all the works on its course.

In no mine which I have visited—and I have visited hundreds—did I ever see equal cleanlines throughout as I saw at Wheal Eliza. The engines—old as they are—are bright as burnished steel, and all dangerous places are fenced by railings, so that any hurt must be wilful. The "dry" is the most commodious and best arranged

that I ever saw, and the most cleanly. It is heated by steam conducted by a small pipe from the engine, at a very trifling expense. I may say with propriety that there is not a mine in Cornwall so well conducted in any respect as Wheal Eliza, which I may truly designate a "model mine."

But for Mr. Williams there would not be a mine at work in the district. He has four or five mines, and although the price of tin is low he is fortunate in getting dividends of profit, which might be increased at discretion, the "reserves" being considerable. It is remarkable that he receives a better price for his tin than is obtained for that of any mine in Cornwall; it is also remarkable that the cost of returning the tin after it leaves the stamps is only 1*l.* 6*s.* per ton. I was informed that the tinstone treated contains 2½ per cent. of black tin, but some portions are of higher produce. A parcel of copper ore of about 50 tons is ready for sale, but tin is the staple article of production at the mines. I was informed also that Mr. Williams contemplates some additional mining in the same locality. He has a very sound judgment in mining matters, and thoroughly digests all propositions before proceeding to action.

TOURIST.

Par, June 18.

LADYWELL MINE.

SIR,—It is a terse but very true saying that there are "mines and mines"—that is, there are mines just puffed up and meant only to fill the pockets of promoters, and mines that are sound and genuine enterprises, that only need money and fair development to make a real and great success. Amongst the latter I imagine may be classed the above mine, under the management of an able captain, an experienced direction, and shares very strongly held; while from the fact that from the three surface levels regular returns of lead have been made for upwards of two years averaging from 20 to 25 tons per month, may be judged what a fine mine will result when the deeper levels were driven and the mine fairly opened out. For this ample funds are guaranteed by the subscription on the new shares, amounting in all to something like, I am informed, 8000*l.*, and half of which, by the second instalment of 5*s.* per share, is now for the most part paid up. It must be remembered also that even with the new subscription the entire capital is very moderate. I have heard that when the mine was started Capt. Williams, of the Van, expressed the highest opinion of its future. A year or two hence Ladywell will come into strong notice again I expect. X.

NEW BRONFLOYD COMPANY (LATE BRONFLOYD).

SIR.—With reference to your correspondent's letter, signed Sampson Trevethan, M.C.E., in last week's Journal, I consider his remarks to be very much to the point, and can endorse his opinion that the mine is once again becoming very rich in silver-lead ore, and, indeed, will become much more so when the 90 and the 110 levels, and even the 120 level, develope the property, the ore becoming of more value for silver as greater depth is obtained. It is stated that the 110 level is alone able to return the entire capital, to say nothing of the deeper levels. Now that mismanagement has ceased, and all legal claims settled with the old Bronfloyd companies, the mine will doubtless return to its former glory, and, perhaps, excel itself. Your correspondent must know, however, that no capital is needed to be placed or raised whatever, the late very heavy calls having been readily responded to by the shareholders, and more than ample funds remain to pay expenses, including the law charges in the prosecution of Mr. Balcombe, the late managing director. No body of shareholders deserve success more than the holders of Bronfloyd Mine, who have had to contend with endless litigation and difficulties, at first almost insurmountable. The 6000 shares of which the mine is composed having but 3*l.* paid reduces the capital to but 18,000*l.*—a mere song for the property. The mine has been at different times finessed, or reconstructed, on sums of 20,000*l.*, 40,000*l.*, and even, I believe, 100,000*l.*, only to be dissolved and wound up, and but for the untiring and persevering energy of the Chairman and directors would have again shared a similar fate; but determination on their part, forethought, and judgment saved it this time. Bronfloyd has entirely cleared itself from the influence of the late manager. A new lease of 21 years is obtained from Sir Pryce Pryce, Bart., residing in the neighbourhood, and registered in different names, and the finest legal talent is engaged to extricate it from the illegal masters of former days; and, above all, Capt. Kemp has returned to the mine.

NEMO.

A SINGULAR MINE REPORT.

SIR,—I remember seeing a printed report on a mine sett situate in the parish of Stithians, Cornwall, which I thought very singular. Speaking of the situation of the sett, the writer said, by way of recommendation, that "the stacks of Tresavean Mine could be distinctly seen in the distance!" At that time Tresavean was not quite idle, and had given profits amounting to 450,000*l.*! To see the stacks of such a mine was, of course, a favourable indication!

Truro, June 16. R. S.

LIFE'S DIFFICULTIES.

SIR,—We have often heard of "life's struggles." I was just thinking of the labours of mine agents and other mine promoters in their endeavours to float mines. Some years ago when in London I met in Cheapside a mine agent from West Cornwall, who said that he had been in London two years trying to get a company for working a mine, and had been reduced to great extremities—sometimes having scarcely food to eat, and penniless. He succeeded at length in forming a company, set the mine to work, and also several other mines, which he superintended, and the salaries from which amounted to about 50*l.* per month. But he had not been long in the receipt of his salaries before death summoned him away. I knew another agent from the same county who spent a great deal of his time in London in similar labours, and under the like difficulties. He located himself for some time at a well-known hotel in Fleet-street, and ran up a heavy score, for which the innkeeper sued him, and obtained judgment that he might take the earliest opportunity of seizing any available assets to satisfy his demand. After awhile such an opportunity occurred, for he found that the captain had sold a sett, and received a good sum for it. So as a cat pounces upon a mouse did the innkeeper pounce upon the captain by a writ of habeas corpus, upon the presentation of which the money was paid. This event was just before the Imprisonment for Debt Abolition Act came into operation. Now that such an Act exists a man who contracts a debt above the amount recoverable in County Courts (50*l.*) if he has no visible assets may set his creditors at defiance, and laugh at them. It has been often said that "there is one law for the rich, and another for the poor." You can sue a poor man in the County Court, and if he has no effects send him to jail, but if a "gentleman" owes 10,000*l.*, and has no seizable effects, he may remain at liberty; you cannot touch him. I am a creditor, and have judgments against two such beings, but I can get nothing because I cannot take their bodies. A history of all the troubles endured by mine brokers in their efforts to start mines would fill a large volume.—*June 16.*

TOURIST.

REMINISCENCE.

SIR,—In the year 1828, when I was surveying a farm called Trevowa, in the Parish of Crantock, Cornwall, I saw near the centre of a field a stone post set up. I enquired for what purpose it was placed there, and was informed that it was to commemorate a fatal accident from lightning which occurred there two or three years before to a young man called Richard Jenkin, one of the three sons of the occupier. Richard Jenkin was by trade a tailor, but he occasionally assisted his father in agricultural work. He was in the habit of keeping bad company and of staying out late at night. His father reprived him for his bad conduct, and waste of time. He was able to plough, and although on the morning of the accident the weather was unfit for any outdoor labour, he said "I will go and plough to ——." He went out to plough with four oxen and two horses driven by a boy, when a thunder storm came, and the lightning killed Jenkin, three oxen, and two horses in a moment—melting the watch in Jenkin's pocket, and the chain attached to it. Mr. Prater, of Tresean, in Cubert, who was half a mile off, was knocked down by the same lightning, but, rising up, he saw the smoke ascending from the spot where the catastrophe happened. The two other sons of the farmer brought on premature death by intemperance. I believe that there is an inscription on the stone recording the tragical event.—*June 15.*

A SURVEYOR.

PARYS MOUNTAIN MINES.

SIR,—Allow me in your next issue to make one or two short remarks in reply to "Mining Engineer's" further enquiries relative to the great ore beds once existing in these mines, where by their extraction left open to view the great open-cast or quarry so frequently spoken of. It may not be generally known to those who have never visited the Parys Mountain that the immense deposits of mineral were found embedded between two kinds of strata. The chert rock on one side and clay-slate formation on the other, each dipping north. The mineral deposits lying upon the clay-slate on the south cheek, and overlapped by the chert on the north. The angle or dip of the whole mass, as far as can be seen, is about 30° from the perpendicular, or about 3 feet in a fathom, and taking this for a guide at the depth and present end of the 90 cross-cut south it shows a distance of 20 to 25 fathoms to reach the north cheek of the great quarry. It may be interesting to "Mining Engineer" to learn that we are anxiously looking forward to cutting the intermediate lodes running parallel with the great open-cast, which were also very productive in the shallow workings, and never proved below the 45 fm. level. Several small branches of copper ore have recently been met with in the 90 south, all of which indicate favourably for what may be expected ere long. In short, these branches may be termed feeders to large bodies of ore close at hand.—*Parys Mines, June 20.*

T. MITCHELL.

SILVER MINING IN PERU.

A very interesting account of the Huantajaya Silver Mines has just been published by Mr. THOMAS C. HELSBY, and as attention is just now being directed to the mines of that country, with a view to induce British capitalists to assist in their development, an abstract of his paper, which is a very elaborate one, will be acceptable. He states that Huantajaya is about four miles (nine miles by road) from Aquique, and as far as he has been able to ascertain the centre of a mineral district, known to extend several leagues at least in various directions, inclining rather from than directly towards the sea. Consonant with this, the principal lodes there—by far the heaviest in the district, starting fan-like as from a central point at about the summit of the hill of that name, and rising prominently above its surface—may be traced for a considerable distance down its eastern slope, running more or less east, north, and southerly, more especially the first two. They incline but little from the vertical, and minor silver-bearing veins cross them in various directions, encountering them at different angles. Where they have taken a coincident course for any distance, as has been found to be the case in some of the old workings, these have acquired great amplitude, one notably in the "Hundimiento" being for some distance of considerable depth, and about 10 yards wide. The latter is one of a group of old mines in the hill which have been extensively worked, and differs from the others in having had saucer-shaped silver-bearing strata at two different levels, as well as its vertical lodes. A considerable part of it fell in a century or more ago, in consequence of the pillars left for the support of the roof having been weakened by the search for silver in their bases, and, from the effects of an earthquake, said to have buried about 80 of the miners then employed there.

The substance of the hill, to the depth of 60 or 70 yards, is composed of a kind of conglomerate, originally of detritus—small broken stone lying in every position conceivable except the primary with regard to each other, and subsequently petrified or bound into a solid mass by the intervention principally of salt, found crystallised all over the country more or less here, and more particularly abounding in mineral lodes—usually to about 30 yards, and in one instance to 80 yards, in depth. The general superficial prevalence of chloride of sodium likewise accounts for the frequency with which the chloride of silver is met with among the ores of that metal found in the upper workings of the mines in this vicinity. Where this is the case, and concomitantly with increased hardness and compactness of the containing rock and the absence of salt, the chloride generally ceases to occur, and its relative place is occupied by the sulphuret. The latter happens from the outset where the vein from its commencement is contained in hard and solid rock, formed, it would appear, previously, or out of the reach and influence of part of the actions above referred to. Some lodes are vertical, or nearly so, but that is the exception. Their dip or inclination varies from 10° to 20°. The attention of the Spaniards is said to have been originally called to the spot by the discovery there of rich placers, or deposits of native silver, found in the first instance in considerable quantity, for whose extraction the rock in some parts has been superficially channelled. These excavations are termed "rajas."

Encouraged by their early good fortune, they persevered in their search for further treasure, following the lead of some lodes to a depth of from 200 to 300 yards. The system of mining adopted, however, was such that nothing less than a large measure of success, added to the employment of inexpensive Indian labour available at that time, could have compensated for the dilatory and painfully laborious nature of the work executed. Long and tortuous galleries at gradually increasing depths and various inclines, interrupted by perpendicular shafts, amounting sometimes to the almost impossible to climb, involved (apart from over taxation of the physical powers of endurance of the miners) the employment of the greatest possible amount of labour with the smallest possible product and profit, relatively to the value of the ore extracted. There was not a single shaft for hoisting out ores by, and everything requiring extraction had to be brought to the surface on men's shoulders.

About two leagues south-south-east of Huantajaya is another but less extensive centre of mineral product and exploration, called Santa Rosa, in which also are mines that have been worked by the Spaniards. The lodes are well formed, though not so powerful as the finest in the former, but the ores produced are of the same class, including native silver. Work is still carried on in some of the old mines here, as in Huantajaya, while several new ones have been opened. This neighbourhood, likewise famed for its rich deposits, continues to yield good ores in encouraging quantities. Huantaca, about the same distance north-north-west of Huantajaya, has become noted of late by the discovery in that vicinity of some good or promising lodes, in which have been found copper, silver, nickel, and gold. In and around all these neighbourhoods there are evidences of a considerable amount of prospecting having been carried on, but the parties interested have generally commanding but little capital wherewith efficiently to test the value of their discoveries. Experience seems amply to have proved that, as a rule, remuneration from the outset is not to be expected hereabouts, but the contrary. Whether a more intelligent search and location of work, aided by modern and improved appliances, would materially alter this condition of affairs for the better has to be proved, but Mr. Helsby entertains a favourable opinion.

In Santa Rosa and Huantaca it has not been rare to find copper and silver ores associated with those of nickel. In Huantajaya silver so far predominates that the ley of copper there is insignificant, seldom exceeding from 3 to 5 per cent.; and what renders this gradation in quality of metal still more curious is the circumstance that as the outskirts of the circuit included in the district referred to are reached galena begins to make its appearance. A singular instance of this kind occurs in the case of the Andacollo, situated to the extreme north of Huantaca, where iron, lead, copper, nickel, silver, and indications of gold are found associated with chlorine, sulphur, salt, and lime. In copper and nickel lodes in these districts the proportion of silver accompanying them is usually found to increase with augmentation in the depth of the shafts or other workings put into them; but not so, or only to a trifling extent, in galena. Some years since several veins of the latter, containing from 8 to 15 marks of silver per cajon were worked for a short time, but found unremunerative and abandoned. One of these in Santa Rosa was discovered to be about 5 ft. wide, and to produce well, the pit in which, however, was only sunk some 10 metres; and within the last year one of this class, about three leagues to the east of Huantajaya, has been worked to a depth of about 30 metres without improvement worth mentioning in its argentiferous character. Were there smelting works here, these would acquire a value they do not at present possess, as fluxing metal for rich silver ores. Besides the ramification of lodes and veins just mentioned there are some others, commencing at their outskirts, which from certain differences of general character would seem to have had a separate origin or connections. Of the latter are a gold and silver bearing quartz lode, about three leagues to the east of Huantajaya; a rather heavy oxide of iron lode about two leagues in the same direction; a similar (but gold-bearing) lode in Huantaca in actual work; one or two heavy quartz-like lodes in Santa Rosa, and another similar one further to the south in Molle not known to be metalliferous (at least as regarded the precious metals); a vein worked in the latter hill containing a small percentage of copper and a little silver; and one in the same locality in which a small shaft has been sunk, the nature of the ore, in considerable quantity, taken out of which seems never to have been ascertained (since the mine has been abandoned), and which is presumably nickel and silver. That this should prove to be the case would not be very surprising, as a mine worked for 25 years in the United States for copper has but recently been discovered to be one of the richest in nickel known in America.

That a more thorough and extensive search for the precious metals has not been made in this vicinity has been due, Mr. Helsby thinks, to the fact of the withdrawal of the Indian serf population, consequent on the nationalisation of the country; the great fame of Huantajaya, which has limited exploration comparatively to its immediate neighbourhood; the poverty of those generally employed in prospecting in a part of the country where there is no water, no casual accommodation to be found, and where everything is dear; the absence of smelting-works and beneficiating establishments, and consequent want of competition in the purchase of ores, whereby these have been considerably depreciated in value; silver only being paid for when preponderant, and beneficiated, the value of the copper, &c., contained in the ore sold has been lost, since not profited by in the manipulation; the expense attendant on the shipment of copper and other ores not utilised here, rendering their extraction from the mines unprofitable; the want of skill displayed in the methods of mining adopted, by which unnecessary expense and loss of time have been incurred in their working; and the greater relative interest taken by the inhabitants of late years in favour of working the easier and more certainly remunerative nitrate deposits. To these, unfortunately, has to be added a certain threatened insecurity of tenure, which during the more or less unsettled period the country has been passing through, has resulted from the facility with which lawsuits, backed not unfrequently by powerful influence, have been sprung on the luckless investors even in good mines, and which becoming known has materially tended to prevent all classes, and more particularly the well-to-do perhaps, from embarking their capital in these enterprises.

As to determining the silver-producing value of a district from the appearance of the surface, Mr. Helsby does not pretend to be a judge, but he has observed both in these neighbourhoods and those of Chanavaya and Patillos, in whose vicinity also silver and copper (as well as gold) have been found, that there is a considerable superficial deposit of lime upon a large proportion of the soil, such as he has not seen elsewhere. The more specific connection of lime, however, with mineral veins of the kinds generally found here, he conceives to be the remarkable extent to which it enters into the composition of the lodes. But whatever the constitution of the lodes, the material forming their walls (in Spanish "cajas" or cases) and separating them from the adjoining rock, is of a clayey or limey nature, deposited to all appearance under the influence and action of water, as if the latter had been rendered turbid and thick during a process of mineral precipitation, the principles involved in which caused these matters to be deposited about the metallic elements engaged, and preferently on the sides of accessible rents or fissures in the earth where these processes occurred, so closing the metals in and preventing their lateral escape while yet in a state of solution, or at least semi-fluidity. The thickest walls of this description found about here enclose the heaviest and richest silver lodes so far discovered in Huantajaya, while close to the town, at the foot of the hill of that name, a large stratified deposit of chalk or lime alone, the only one heard of in this vicinity, crops up from below, and may be traced for some distance along the surface of the ground.

From considering the part which he is told lime plays as a precipitator or interruptor of the extravasation of metals, and from various other circumstances, Mr. Helsby is convinced of the high degree of probability of the existence of valuable metalliferous deposits in (for the most part) low-lying situations, undenoted otherwise by a single sign, except it be the lead of lodes seen to take those directions, and which only await the expenditure of patience, capital, and well-directed efforts in the search eventually to discover. He then goes on to notice some signs locally recognised in the district as indicating probable proximity of ores in lodes possibly worth working; adding likewise a few other indications of a similar character which have suggested themselves to him. One of the commonest signs of this kind is a discolouration of the surface immediately over the run of a mineral lode or vein, produced by the oxidation of the metals it contains, effected by the combined action of the sun and air. Thus its course may be tinted of a grey, a red, or a yellowish green complexion, which, contrasting with the more neutral colour of the surrounding earth makes it clearly distinguishable. In these cases the surface most frequently maintains its natural (the adjacent) level, except where a hill or prominence is surmounted in its course, when the same causes which have operated its discolouration tend to produce a fraying and falling away of its material, and consequently a depression there. When, on breaking off a piece of such a lode, the outside is found decidedly darker than the inside, it augurs favourably, for that is the general tendency resulting from the oxidation of metals, and when the contrast is very marked, and particularly if it presents the peculiar brownish black of oxidised silver, it is a good sign for silver, which, more than any other metal, is blackened by this means.

By the different colours for the most part present in specimens of ore so taken, both a variety of chemical combinations of one and an association of the ores of different metals may be indicated. Not only so, but where, as here, those present are of a high class the discovery of a heavy deposit or proportion of the red oxide of iron even in a lode, so far from rendering it unworthy of notice on that account, is in itself promising, or at least renders such a spot worthy of examination, for (1) it is a known matrix of gold, and (2) the rule here being that the superior underlie the inferior metals, and usually in their electric order, it may, and that in proportion to its quantity and the degree of its concentration, be found the precursor of very valuable deposits either of copper or of silver, or possibly of both. A remarkable instance of the kind occurred in Punitaque, Chili, some years since, where a very heavy lode of oxide of iron was worked to a depth of 300 ft., some ten thousand tons of a fine ore of that description being taken out, when an abundant deposit of rich copper (peacock metal) was suddenly struck, enriching the then fortunate owners, who had been under the necessity of expending, to drain the mine only, $45,000. The district was copper-producing.

The lodes most worked by the Spaniards in Huantajaya are remarkable not only for the reasons mentioned, but because they are not superficially metalliferous; remaining still, therefore, with the exceptions before noted, as they existed originally, prominent and untouched above the ground. Were it not for the masses of native silver referred to found in certain spots about them they might, and not improbably would, have remained unexplored until the present day. And, secondly, though massive they disappear altogether after descending the hill some distance on the town side, whether because, contrary to all ordinary rule in such cases, they there terminate, or because their further courses in that direction are concealed by the alluvial and other debris accumulated in the valley below. Chloride of silver, when found in Chili, which is seldom, occurs in isolated nodules of various dimensions met with in lodes principally containing sulphurets. Here it is of frequent occurrence, and, owing evidently to the extensive prevalence of salt, and the porousness of

its most frequently calcareous matrix, it is generally found in minute, often almost imperceptible, portions diffused throughout the mass of the lode. The salt, indeed, in some cases having become saturated with the chloride of silver before crystallising, then assumes a dark complexion, almost as dark as green bottle glass, and saturating or filling up the pores and crevices of the containing material, this becomes milky on moistening it with an alkaline reactive. These ores are called "lechadores" from this peculiarity. A Chilian miner hence is often at a nonplus to estimate the value of an ore when first presented to him after his arrival here; while those accustomed to work in this department, though they say the salt "oppresses" the metal when they find it abundant in the top of a lode, yet consider its presence in one a very promising feature; and it is found, in fact, indicative of the probable discovery of horn silver at a greater depth.

The chlorides are, Mr. Helsby explains, among the moist unstable of mineral combinations. A feeble electric current will decompose the chloride of silver; so also will the rays of the sun, as witness the photographic picture; while gold is reduced from its chloride at a comparatively low temperature, and in the presence of inferior metals. Unlike silver, however, while in combination with chlorine, gold is freely soluble in water, and in the case above assumed appears to have been repelled or expressed to the surface in a state of solution, there gradually to become metallicised under circumstances favouring that result. Another of the peculiarities of some chlorides is that they are extremely hygroscopic. This is particularly the case with chloride of lime, undoubtedly present to some extent in the gangue of the ores under consideration. This, added to the general tendency that way of their mineral elements so combined, commencing with the salt, and terminating with the iron, which, likewise, chlorine so strongly affects, thus causes them rapidly to attract moisture from the atmosphere, when charged with it, and while accessible to the latter, even though buried underneath the earth's surface. The water thus condensed and drawn towards these lodes—a process principally taking place in damp and cloudy weather and by night—dissolves and conveys with it the salt it comes in contact with in their immediate proximity, and that in particular which lies above them on an incline. Evaporating again during the day, and under the influence of a warm sun, the salt both gains access to the lode (the contents of which it is calculated still further to modify) and, the situation favouring, accumulates in amount likewise above it, to the extent sometimes of forming collections of nodules generally about 5 or 6 in. each in diameter, and thus becoming very conspicuous. This, therefore, he would suggest, is worth study, as offering an indication, when it occurs, of the possible (and even probable) proximity of metalliferous deposits of value in situations devoid of other signs, since these are not unfrequently to be met with, as he has observed, both in this and the neighbouring mineral district of Chanavaya. It is a very noticeable fact in this estimation that great quantities of salt mingled with gravel are found about the hill of Huantajaya; and, indeed, in masses of irregular sizes, piled up so as to form walls, constitute one of the principal remaining evidences that the town once held a considerable population.

The discovery of mineral lodes by the smell is also referred to by Mr. Helsby, who mentions that while the vapours of sulphur are pungent, and those emitted by arsenic are disagreeable and suffocating, the odour of chlorine so evolved is usually mild and somewhat sweetish, analogous to the scent of chloroform, though he has known it sufficiently hydrogenated to resemble muriatic acid. What has particularly attracted his attention in this respect is that, owing to the facility for decomposition of metallic chlorides already noted, he has repeatedly encountered the mild odour referred to, sometimes faintish, but in one instance very strong and unmistakeable, on passing near a mineral lode heated by the rays of a strong sun. On the occasion last mentioned it was indeed the first intimation he had of being in the proximity of such a lode. Now, as the "puna" is a localised phenomenon of limited extent, not requiring above 200 yards sometimes to traverse, it is evident that its effects are not simply due to the altitude of the situations in which it is found, but that it proceeds from local causes of a different character; this alone is suggestive of an alteration in the chemical condition of the atmosphere in such places; and if to this be added that an immediately sensible diminution of muscular power supervenes, followed even by coma at times, on travelling through the belts or currents of air so affected (specifically asphyxia), he thinks that both theory and fact on trial would be found to sustain the correctness of his conclusions that the "puna" and these emanations are essentially one and the same, and in all probability equally denote the near presence of heavy lodes containing large metalliferous deposits. The more frequent occurrence and well-marked character of these phenomenon in elevated regions, coinciding as it does with the well-known existence in the higher Andes of stronger lodes and ores in much greater abundance than are found in coast ranges, is still another favouring indication.

On the adjacent range in front of Huantajaya is La Cantora, a new mine yielding ores in tolerable abundance of from 40 marks to 200 marks, exists and Mr. Helsby thinks from its proximity to Huantajaya it merits examination. Underneath the great deposits of silver, now for the most part extracted from the old mines worked by the Spaniards in Huantajaya, a "mesa de piedra" (stone table), or plane of porphyritic and ferruginous stone is met with, 60 to 70 yards thick, on arriving at which, the ore there giving out, they stopped work and abandoned them. Mr. Helsby thinks from experience elsewhere that equally rich mineral will be found below the mesa. In Chili when copper is found associated with silver, it depreciates the estimation of the ore for the latter metal, since it "degenerates" in depth, or changes to copper only. Here exactly the reverse is known to take place, copper in a silver ore gradually giving way to the latter as the work progresses, and the proportion in which it is present in an ore generally bears some relation to the depth at which it is taken out of the lode; increasing gradually—often from the very surface. Indeed it has been the rule here not to work a vein or lode unless a promising grade—say 8 or 10 marks at least per "cajon"—was discovered upon the top; and the depth at which it is ordinarily expected to be remunerative is from 30 to 40 yards. Much native silver is said to have been extracted from some of the workings in the old mines, and is still occasionally met with in one or other of the new: it exists almost always, however, in combination, and its ores are found associated more or less with those of other metals.

There are no such powerful lodes or ledges of ore of homogenous structure and uniform but extremely low, yet paying, grade known to exist here as have been found elsewhere, but the large number of those that do occur offer great facility for the extraction of considerable amounts of metal. Improvements in mechanical and other industrial appliances have latterly enabled the miner and the smelter in Chili to obtain profit from the extraction and beneficiation of copper ores, containing as low as 5 per cent., where previously 10 or 12 per cent. was necessary to make these operations pay. There is no reason why the same should not occur here with low-grade silver ores, of which large quantities in the shape of refuse from those already quarried exist in some of the old mines, and abound otherwise in the neighbourhood. As it is, though one of the great drawbacks to extensive exploration here is, as has been stated, the absence of water, which all has to be taken with or to the explorer for the supply of his animals as well as himself, or he cannot travel far on, or spend much time in, the pursuit of his avocation, and living otherwise is expensive. On the other hand, the proximity of these mineral districts to the coast, as compared with many others in the country, economises the cost of carriage, whether to or from the mines, even with the indifferent means of conveyance at command, whose improvement it prospectively facilitates, while the very want of water materially contributes to diminish the expense attendant on the working of mines, since they give no trouble to keep dry. Notwithstanding every discouragement, however, of which there is still a large balance, consequent on the difficulties yet in the way of successful mining, a considerable number of persons contrive to eke out a subsistence by it, and since the check to the saltpetre trade a necessarily renewed interest has been taken in it. Where it is intended to put serious work on a mine (and it should not be commenced without the prospect of such intention) he considers the best plan to be, in the first instance, to go down with the lode, by which a better judgment may be formed, both as to the eventual advisability of such a course, and how best to put it into execution.

JOHNSON'S NEW UNIVERSAL CYCLOPÆDIA.

Some three years since reference was made to the publication of the first volume of "Johnson's New Universal Cyclopædia: a Scientific and Popular Treasury of Useful Knowledge" (New York: A. J. Johnson and Son), and although it was found necessary to extend the work to four volumes instead of three as originally intended, it is now completed, and may be unhesitatingly pronounced superior to anything of the kind which has hitherto appeared either in the United States or in England. By far too many of the cyclopædias in the market are so entirely compilations, that as works of reference for those who have any care for accuracy or minuteness they are positively worthless. The reason is obvious—the cost of printing and publication alone is necessarily so large that unless an enormous circulation can be secured there are really no adequate funds available for the payment of those best able to contribute the various articles required. In the result the Editor is restricted in the outlay to be made for literary labour, and too often compelled to write not only upon subjects with which he is fully acquainted, but also upon those about which he knows extremely little, if anything. In the conception and production of "Johnson's New Universal Cyclopædia" an entirely new course was determined upon. It was assumed that the chances of pecuniary success would be greater in proportion to the completeness of the work, and that the first cost of securing that completeness might safely be made a secondary consideration. The results have far more than justified the anticipations—the book enjoys equal celebrity for accuracy, scope, and cheapness, so that the profits upon an individual set is insignificant, the circulation obtained has been so enormous that all concerned are well satisfied.

It was pointed out at the time the production of the cyclopædia was commenced that its leading feature was that each particular article was to be supplied by a recognised authority upon the subject to which it applied—a feature which did not fail to be appreciated by the leading literary critics both in England and America. To prevent the possibility of failure, the general management was entrusted to two editors-in-chief, who were empowered to appoint an ample staff of associate-editors each to superintend the special department in which he was an acknowledged authority. The names composing the editorial staff were alone sufficient to secure the cyclopædia a high reputation even before a single page had been seen by the public. The editors-in-chief were—President Barnard, of Columbia College, New York, one of the highest living authorities upon all questions connected with the exact sciences, as well as the president of the leading science university in the States, and Prof. Arnold Guyot, of the College of New Jersey, who is not less celebrated in the particular branches of science to which he devotes himself; and the associated editors, each of whom had a defined field of labour allotted to him, included such men as Profs. Chandler, Drisler, Dwight, Newberry, and Parker, of Columbia College; Profs. Trowbridge and Woolsey, of Yale College, and about a couple of dozen others of scarcely less reputation. With editors of this class it was practically impossible for the views of charlatans, or others of doubtful ability, to obtain currency through the cyclopædia. The contributors, numbering some hundreds, were selected from among the highest scientific and literary authorities of both Europe and America—although in some cases very high prices had to be paid for their co-operation—and as Prof. Dana, of Yale; Prof. Egleston, of Columbia; Dr. Gill, librarian of the Smithsonian Institute; Dr. Tyndall, the late Canon Kingsley, President Porter, of Yale; Dr. Raymond, United States Commissioner of Mines, were among the number, the manner in which the selection was made can readily be judged of. Indeed, it may safely be said that but from the great influence and high scientific reputation of President Barnard, Prof. Guyot, and the associated editors making it an honour to take part in a work with which they were connected, the co-operation of many of the contributors could not have been obtained at all.

The cyclopædia forms four handsome volumes of large size, and comprises between 6000 and 7000 pages, closely printed in small but exceedingly clear and legible type. The articles, although in most cases concise—seldom exceeding two or three pages—are full of information brought down to the latest moment, so that in referring to the work the utmost possible confidence may be placed in the details given, whilst there are very few subjects upon which information will be sought in vain. The work, which by the way is also an admirable gazetteer of the United States, has already obtained a large circulation, and as it cannot fail to be approved by all who consult it there can be no question that it will long enjoy a prominent position amongst the standard literature of the country. Both the general reader and the man of business will find the cyclopædia invaluable, since not only are the facts readily accessible, but are so numerous that they could not otherwise be verified without the advantage of a library of that extensive character which few possess.

THE CHEMISTS' MANUAL.

That one's private note-book frequently contains facts of greater utility than anything to be found in the most carefully-arranged text-book, because it is intentionally adapted to one especial object and nothing else, has long been acknowledged, and it is upon this consideration such works as that of Dr. HENRY A. MOTT, jun.,* will certainly have a very favourable reception among those for whom it is intended. In recommendation of the work, Prof. Chandler, Dean of Faculty of the Columbia College School of Mines, very truly remarks that the literature of analytical chemistry in the various branches of qualitative, quantitative, blow-pipe, and technical analysis, and assaying, has expanded to such a degree as to make it impossible for students and even for most professional chemists to possess a complete library in these branches of science: moreover, much of the literature is sealed to many chemists by being published in French or German, or in Journals and Transactions of Societies which are inaccessible. A further embarrassment arises from the multiplicity of methods given in special works from which few can select without first testing several. Dr. Mott has carefully selected those methods which work best and are most reliable in the hands of the general manipulator, and thus assists him to secure the results he his seeking—his book is, in fact, an intelligent students' note-book systematised and perfected into a book of reference.

Tables of the Elements and of Specific Heat, of course, occupy the first place, and the section on Qualitative Analysis includes an account of the deportment of the metals and their salts with reagents; scheme for qualitative analysis, detection of acids, table of analytical chemistry, Zettnow's scheme for qualitative analysis, reactions of fat oils, fat oils, tests for impurities in pharmacopoeial preparations, and of the influence of organic substances on the precipitation of metallic oxides. Zettnow's scheme, which renders sulphuretted hydrogen and sulphide of ammonium unnecessary, and Stas-Otto's scheme for the Detection of Alkaloids, are particularly interesting, although the former is not likely, one would think, to supplant Fresenius's scheme when the sulphuretted hydrogen and sulphide of ammonium are within reach.

The methods for the detection and separation of alkaloids, described by Trapp in the Jahresbericht and in the Vierteljahresschuft für Prak. Pharm., are carefully given. Attfield's Table of Tests for Impurities in Pharmacopoeial Preparations is reprinted; as is also, with very slight alterations, Egleston's scheme for the qualitative determination of substances by the blow-pipe, and Cornwall's method for the determination of bismuth in the presence of lead and antimony, both of which have been published in the *Mining Journal*. There are elaborate tables of specific gravities. The Mineralogical notes include only the principal of those which have been usefully applied in the arts, so that all the information usually required is compressed into a very small space. With regard to the diamond, Dr. Mott remarks that as it is very difficult to distinguish it from some closely allied stones, it is better not to trust to the judgment alone, though some jewellers think they can detect the diamond with ease; he, therefore, inserts Prof. Egleston's table for the determination by scientific means. The diamond has a density of 3·52—3·55, simple refraction, the index of refraction being 2·455 (which really distinguished it from all other stones), and the electricity is positive but not durable. Ruby, sapphire, and oriental amethyst have—density, 3·9—4·3; refraction, double 1 axis; index of refraction, 1·765; electricity last several hours. The corresponding particulars for chrysoberyl are 3·5—3·8; double, 1·760; lasts several hours. White topaz, which has often been mistaken for diamond—indeed, there are some who doubt whether the so-called Portuguese diamond of 148 carats is not merely a white topaz—has density, 3·4—3·6; refraction, double 2 axes; index of refraction, 1·635; and retains its electricity for more than 24 hours. For chrysolite the details are—density, 3·3—3·5; refraction double; index, 1·660; electricity, positive; emerald—density, 2·6—2·8; refraction, double 1 axis; index, 1·585; electricity, positive; spinel, 3·4—3·8; simple, 1·755, and not tried; zircon, 4·1—4·6; double 1 axis, 1·990; and positive not durable. Quartz corresponds in almost every particular with emerald, though differing in hardness and colour, having—density, 2·6—2·8; refraction, double 1 axis; index, 1·549; electricity positive, not durable; and strass is of variable density, usually about 3·5; simple refraction; its electricity being variable and not durable.

With regard to stoichiometric calculations, the examples are taken from Barker, whence also it should have been mentioned the admirable table of the nature of molecules is also quoted and acknowledged. Then follows a chapter on schemes for the quantitative analysis of the most frequently occurring compounds, embracing not only the ordinary ores and minerals, but urine, blood, milk, and sugar. Descriptions are given of the methods of assaying iron ore, gold, and silver, lead, antimony, and platinum; a section on the Chemistry of Man; and about 100 pages of miscellaneous information concluding the volume.

Both to students and practical men Dr. Mott's manual will prove of the utmost possible value, since by bringing together in a compact and readily accessible form all the information usually required, it will be a very satisfactory substitute for quite an extensive reference library on the subjects dealt with.

* "The Chemists' Manual:" a Practical Treatise on Chemistry, Qualitative, and Quantitative Analysis, Stoichiometry, Blowpipe Analysis, Mineralogy, Assaying, Toxicology, &c. By HENRY A. MOTT, jun., E.M., Ph.D. New York: D. Van Nostrand. London: Trübner, Ludgate Hill, and Sampson Low, Fleet-street.

THE COAL TRADE.

The new annual edition of Mr. Frederick E. Saward's Review of the Coal Trade in the various countries of the world—that for 1877—has just been issued, and contains the same amount of valuable statistics as usual. The consumption of coal throughout the world continues to show a slight increase, the present demand reaching about 275,000,000 tons. The decline of 1874 has been more than recovered, but there is no indication of an augmented consumption such as need cause any alarm. It is a little surprising that with the enormous waste of coal known to be going on, and the progress of invention, the increasing requirements in the way of heating and generation of power, and for industrial as well as domestic purposes, cannot be met with the same consumption, especially as the best authorities constantly state that by existing systems of consuming fuel not more than from one-eighth to one-quarter of the power contained is utilised. In America there was a decreased production of anthracite, and an increase in that of bituminous coal, and most European countries show a small increase. Nova Scotia does not keep pace with the forward movement in coal production noticeable in other localities. Great Britain produces as much coal as all the other countries of the world combined. The production of anthracite in the United States commenced in 1820 with 365 tons, and from that time to the present the aggregate output has been 206,666,325 tons. The highest price realised during the year on the Lehigh Coal Exchange for Wilkesbarre lump coal was $5·55, or about 22s. per ton, in January, and the lowest—the auction price—was $2·11½, or about 8s. 5d. per ton.

The figures showing the import and export coal trade of the United States are decidedly favourable; the imports of bituminous coal show an increase of only 76,409 tons, and the increase of export of coals of all kinds reached 18,765 tons, the figures being—imports of bituminous coal, 488,132 tons in 1876, against 411,723 tons in the preceding year; exports of bituminous coal, 253,387 tons in 1876, against 234,997 tons in 1875; and export of anthracite coal, 362,044 tons in 1876, against 361,669 tons in the preceding year. The coal area of Vancouver Island is estimated at 390 square miles, and a considerable proportion of the coal supplied to San Francisco is thence obtained. The output in 1876 was 140,087 tons. In Spain there is said to be about 3501 square miles or coal-producing area in the provinces of Castile, Leon, and the Asturias. The output is not increasing, having been 560,000 tons in 1875, against 600,000 tons in the preceding year. The product of coal in Italy for 1874, the latest date for which figures are obtainable, was 2000 tons of anthracite, 90,500 tons of brown coal, and 90,000 tons of peat coal. In Austria there are about 1800 square miles of coal-producing area, and in 1875 the output reached 10,895,000 tons, that of the three preceding years being about the same. The total area of the coal fields of Russia is estimated to be about 30,000 square miles. The chief sources of supply are the basin of the lower Don, which amounts to nearly one-half of this area, the coal being what is said to be anthracite; in the west the Government of Kiev and Kharkoff; further to the north the great central basins, comprising the government of Tver, Kalouga, Moscow, Raizan, Tula, and Novgorod, extending northward as far as the Dwina. To these items may be added that of the Kharkoff beds of anthracite and private coal beds of the districts lying to the east of the Vistula. The production of Russian coal in 1875 was 1,750,000 tons, and the industry is rapidly developing. In New South Wales the output for 1874 was 1,298,400 tons.

In connection with the coal trade of France it is mentioned that Mr. Burat divides the coal measures of that country into five distinct geographical groups—those of the North of France form a long and narrow zone, which crosses Belgium, and lies at the surface from Aix-la Chapelle to beyond Mons. It can be followed for 250 miles in the line of Liége, Charleroi, Valenciennes, Douai, Bethune, with offsets into the Boulogne district, Raty, Ferques, Fiennes, and Hardinghem, where it begins to make its descent below the channel to re-appear in England. The surface of this great basin is about 625,000 acres in extent; the breadth of the carboniferous zone varies from 20 feet to 33,000 feet. France, however, owns but a small share of this measure, which lies in the departments of the Nord and the Pas de Calais. In the coal measures of the East of France are comprised the basin of the Saar, and that of Ronchamps (Haute-Saone). The Saar basin, which is above ground in Prussia, is continued below ground under the secondary formation of the Moselle, just as the great Belgium basin is continued along the right bank of the Rhine to form the rich basin of the Ruhr. With this group we may connect the Alpine offsets of Savoy and the Valais. The western coal measures, comprising the basins of the Basse Loire and of La Vendee, yield anthracite and anthracite fuel. The coal measures of the Centre comprise the rich fields of Saone et Loire, the Allier, the Loire, and Auvergne. The basin of the Loire alone has a superficial area of about 64,000 acres; that of Saone et Loire 108,000 acres. The coal measures of the South, situated in the valleys of the Lot, the Herault, and the Gard, comprise several basins, the two most important of which are the colliery groups of the Aveyron and the Gard, comprising between them an area of 67,220 acres. At the extremity of the chain of the Alps there is a small open coal field cropping up at different points of the Var. These various measures are isolated one from the other by mountain masses, valleys, and strata, belonging to different geological periods. The irregular conditions under which French coal is found adds considerably to the cost of winning.

PHOSPHOR BRONZE WIRE-ROPES.—M. J. Manne, the manager of the Phosphor Bronze Works, at Val-Benoit, Liege, has made pit ropes entirely of this alloy. Phosphor bronze ropes are said to have the advantage of offering great resistance to strains of traction, of being very pliable and unoxidizable, and of resisting any attack of

corrosive water, while the wear due to the contact of the wires is less than in other metallic ropes; they also preserve their pliability after wear. These phosphor bronze ropes are used in Belgium, at the Bois-du-Duc, Horloz, and Courcelles-Nord collieries among others.

SLATE QUARRYING IN CARMARTHENSHIRE.

Subscriptians are being invited for 12,000*l.* upon 10 per cent. debentures having a first charge upon the quarries, plant, and other property of the CLEDDAU VALLEY SLATE QUARRIES COMPANY, which was formed some three months since, for taking over and extending slate quarries at Llandysilio, Carmarthenshire. The nominal share capital is fixed at 24,000*l.*, and the debenture capital at 15,000*l.* Of these 16,500*l.* net in shares and 3000*l.* in debentures represents the purchase price, and the 12,000*l.* are offered to the public, who are to receive 6000*l.* worth of fully-paid shares by way of bonus, so that 3000*l.* worth of shares remain to be subsequently dealt with. It is proposed to redeem the debentures at 11*l.* per 10*l.* bond by half-yearly drawings extending over 16 years. The debenture holders are to elect trustees after the debentures have been allotted.

The property, 216 acres in extent, faces the River Cleddau for more than half a mile, and between the hill and the river is a valley averaging 60 yards wide, available for building and machinery, and affording ample tip room. There are two different veins—one green, of excellent quality, free from blemishes, profitably worked, and realising 20*l.* per 1000 slates best sizes, in the Whitland Abbey Quarries adjoining; the other a blue slate, of first-rate quality, and well situated for working. The slates from both veins cleave well, smooth and even, and are as durable as any slate in the Principality. There is ample water-power for all purposes of machinery necessary for an extensive development of the quarries. They will be worked by open galleries one above another, thereby unwatering themselves, whilst the refuse will be tipped down from each gallery; and it is mentioned that the slate being good and marketable almost to the very surface a large amount will be saved in the development of the works, whilst returns of produce will be made from the very day of commencing. Labour is abundant and cheap in the locality, much moreso than in North Wales generally. The quarries have been opened to some considerable extent, and have had the great value of the slate veins fully proved. It must be borne in mind that no delay will take place in making this a productive property, as immediately on the company's taking possession of and working the quarries the profits will commence, and increase with rapidity as the works progress.

The particular attention of intending investors is drawn to the absence of any payment for royalty, the company holding the right of quarrying to any extent for an unexpired term of over 40 years at a fixed rent of 65*l.* per annum. It is considered that the saving on this item alone would be equal to the whole amount necessary for the interest on and redemption of the debentures. The quarries are situated about four miles from Clynderwyn Railway Station, on the Great Western and South Wales Union Railway, and three miles from Llanglydwen Station on the Whitland and Taff Vale Railway, and from either of these stations there is easy and constant communication with Milford, Pembroke, Swansea, Cardiff, and every other part of the kingdom. It is, however, proposed to make a branch line from the quarries to the Llanycefn Station on the Clynderwyn and Maenclochog Railway, a distance of less than three miles, by the side of the River Cleddau.

The cost of this railway will be very moderate, as the land over which it will run is singularly level, and no engineering difficulties whatever present themselves. The necessary arrangements for way leave and junctions are now being made, and it is believed that such a line will, independent of the convenience it will afford to these quarries, be very profitable, as, in all probability, there would be a considerable traffic from two other quarries, and from the locality generally. Pending the construction of this branch line arrangements have been made by which the produce of the quarries will be conveyed to the Clynderwyn Station at a cost not exceeding 5*s.* per ton. The reports of Capt. Thomas Nicholas, of the Hafoddu and Elwyn Valley Quarries, of Mr. J. R. Price, of West Gilfach Quarries, and of Mr. Wm. Pritchard, of Rosebush Quarries, upon the property are all of an encouraging character.

TREATING NICKEL AND COBALT ORES.

For the treatment of nickel ores, consisting of silicates of nickel and magnesia, containing variable quantities of other substances, more especially the nickel ore of New Caledonia, an improved process has been patented by Mr. E. L. MONTEFIORE, of Paris. The ore, after having been reduced to a fine powder, is attacked by strong sulphuric acid, preferably at 60° Beaumé; this can be effected either by solution in the ordinary manner, or by the mixture of the pulverised ore with the requisite quantity of sulphuric acid, according to the composition of the ore, the proportion of acid being such as is sufficient to transform all the nickel and magnesia to the state of sulphates. The mixture being put into heap gets spontaneously heated, or the sort of combustion which takes place can be provoked or hastened by the application of a burning substance; the mass becomes heated and hardens by the transformation of the mass into a mixture of soluble sulphates and anhydrous silica. The soluble sulphates are separated by treatment of the mass with hot water, which then contains the salts of nickel and magnesia and the iron partly in the state of protosulphate. The iron is peroxidised by one of the processes well known, and is then precipitated by carbonate of magnesia or by one of the known agents, but he prefers the use of a milk of magnesia. The iron may also be peroxidised partially or totally by the calcination of the pulverised ore, either before or after sulphatisation, and if necessary by the admixture of a proper quantity of nitrate of potash or nitrate of soda.

The solution being separated by decantation, washing, and filtration, contains now only salts of nickel and cobalt with magnesia, this solution being heated by steam or otherwise. A sufficient quantity of milk of magnesia (an emulsion of caustic magnesia) is added to precipitate all the nickel, or an excess of magnesia may be used, and after separation of the excess of liquid the precipitate may be treated either with a solution of sulphuric acid, or an excess of a solution of the sulphates of nickel and magnesia, which takes up all the excess of magnesia. The colourless liquid is a solution of sulphate of magnesia, which may be concentrated by evaporation, cooled, and crystallised for sale. The remaining oxide of nickel is well washed, dried, calcined, and reduced by the ordinary methods used for obtaining metallic nickel from the oxides of that metal.

The solution of soluble sulphates obtained from the ore by the above-named process may be evaporated to dryness, and the residuum calcined, either alone or after mixture with the quantity of saltpetre necessary to convert all the iron to the state of insoluble peroxide, easily to be separated by washing. The solution containing nickel (and cobalt) with magnesia may either be treated by the method above described, or may be evaporated to dryness and calcined with mixture of saltpetre of magnesia, or of carbonate of magnesia, in quantity sufficient to decompose the sulphate of nickel and reduce it to the state of oxide. The mixture being now washed, the nickel remains in the state of a grey oxide, which may be washed, dried, and reduced to the state of metallic nickel by the methods generally employed.

A continuous reduction is preferred by Mr. Montefiore to any other for the reduction of the oxide of nickel to the metallic state. This consists principally of one or several pots or tubes placed vertically, and open at both ends; they are so placed in the furnace as to be easily exposed to the required heat; the upper end of each pot or tube, protruding higher than the top of the furnace, is covered by a movable cover; to the lower part of the earthern tube or pot is adapted an iron tube closed by a sliding door. The oxide to be reduced is introduced by the top into the pot or tube after being mixed with coarsely pulverised charcoal; the reduced metal is withdrawn at the bottom, mixed with the excess of charcoal, a new supply of mixed oxide and charcoal is introduced at top, and so on continuously. It is evident that the time given for the reduction can be regulated at will by the regulation of the intervals for withdrawing the reduced metal and the quantity withdrawn each time. As the work is continuous, and the pot never allowed to cool, this mode of reduction is very economical.

The essential features of the invention are the treatment of the pulverised ore, calcined or not, by sulphuric acid, and especially the rapid combination, as described, without solution; the separation of iron from its sulphates by magnesia, the separation of nickel from the magnesia in their sulphated solutions by magnesia, thereby obtaining nickel without magnesia, or with but slight traces of this substance, and on the other hand sulphate of magnesia exempt from foreign matters; the evaporation to dryness of the solutions of the mixed sulphates, and the separation successively of the iron and nickel by calcinatiou with the mixture of saltpetre for the first-named metal, and magnesia for the second, and the use of pots open at both ends for the continuous reduction of the oxide of nickel.

Meetings of Public Companies.

PEDN-AN-DREA CONSOLIDATED MINES.

At a meeting held in the account-house, Redruth, on Thursday, the accounts showed—

1876, Aug. 4—Call of 8*s.* 6*d.* per share on 6000 shares	£ 2,550	0	0		
From Aug. 4 to May 30, 1877:—					
Black tin sold, 342 tons 10 cwts. 1 qr. 7 lbs..	15,414	10	2		
Arsenic	300	10	4		
Copper ore	33	5	5		
Spare materials	185	3	0		
Water supply to town	7	0	0=	£18,490	8 11
1876.—By purchase of mines and plant	£ 2,512	10	0		
Unused stores Aug. 4 and transfer of leases	66	12	9		
Labour cost from Aug. 4 to end of May, 1877	7,765	7	3		
Merchants' bills, ditto	4,701	1	5		
Local rates	128	8	5		
Stannary and income tax	34	14	7		
Rentals	37	10	0		
Lords' dues	511	19	6=	15,758	3 11
Balance in favour of company				£ 2,732	5 0

From which a dividend of 9*s.* per 6000th share was declared—2700*l.*—leaving 32*l.* 5*s.* balance in favour of the company to be carried forward to next account.

WHEAL PRUSSIA.

At a meeting held at Pedn-an-drea account-house, Redruth, on Thursday, it was stated that since the last account they have sold 21 tons 8 cwts. 0 qr. 17 lbs. of black tin, for 963*l.* 6*s.* 10*d.* The costs and merchants' bills have amounted to 558*l.* 2*s.* 5*d.*, and the lords' dues 55*l.* 15*s.* 7*d.*, leaving a balance in favour of the company of 349*l.* 8*s.* 10*d.*, from which a dividend of 1*s.* per 6000th share has been declared, leaving a balance of 49*l.* 8*s.* 10*d.* to be carried forward to next account.

WEST BASSET MINING COMPANY.

A meeting of adventurers was held at this mine on Thursday, Captain EVANS (the purser) in the chair. The labour cost, &c., for the three months ending April 21 was 701*8l.*, merchants' bills 679*l.*, coal 414*l.*, making a total on the debit side of 10,759*l.* On the credit side there was copper ore sold to the amount of 345*l.*, after deducting the dues. Of tin 138 tons had been sold, realising, after the deduction of dues, 5336*l.* The balance due from the last account was 2577*l.*, and the balance due from the adventurers was now 5077*l.*, the loss on the quarter's working being 2500*l.* The bankers' pass-book, which the purser at first declined to put upon the table, and only did so after great persistence on the part of Mr. Heard, showed a debt to Messrs. Tweedy's bank of 25,000*l.* In a long discussion, however, it was elicited that the costs were well charged up, and there was owing to merchants, to the end of April, only 2500*l.* A call of 6*s.* 8*d.* per share—2000*l.*—was made; and it was stated that the number of hands had been reduced by 70.

SAINT HARMON LEAD MINING COMPANY.

The first annual general meeting of shareholders was held at the offices of the company, Change-alley, on Thursday,

Mr. G. F. C. SIMMONS in the chair.

Mr. HENRY R. MOORE (the secretary) read the notice calling the meeting. The report of the directors (which appeared in last week's Journal) was taken as read.

The CHAIRMAN said he took it for granted the shareholders had all read the report of the manager, and there was really very little to add to it, because Mr. Kitto made it a rule to describe in the clearest possible manner the position of every mine he was connected with, and there was little left for a Chairman to say beyond what appeared in the report. He thought the shareholders might be satisfied with that report. The money had been spent in developing the mine, and no doubt under Mr. Kitto's supervision this had been done wisely. In Mr. Kitto's report it is stated, "The amount of work executed at the various points of operation may be gathered from the following remarks—the 67 has been driven on the course of the lode 40½ fathoms east and 40 fms. west, the lode in each end being very strong, and in the latter particularly of a highly mineralised character, whereas the former or eastern level has yielded some ore for several fathoms in length, but so far has not been sufficiently rich to pay for stoping. In the western level the lode at present is of an exceedingly promising character, and I shall be greatly surprised if it does not soon become more productive." Further on there was the following satisfactory statement:—"The cutting of these south lodes, in my opinion, ranks amongst the very best features of the enterprise, and great results may be expected from them, if we may judge from indications where opened upon near the surface. We have driven other cross-cuts in the different levels, amounting together to 21 fms. 3 ft., but those have been chiefly for the purpose of proving the size and character of the lode." They had not made any particular discoveries yet, but when the company was started it was distinctly stated that any very great discoveries were not expected for some time; the policy had been to develope and open up the mine, and as far as this went he thought the progress which had been made was highly satisfactory. It was also satisfactory to know that the shares were all subscribed for, and that the Consols necessary for the guaranteed dividend had been deposited before any payment had been made to the vendors, and there was now sufficient money in hand to give the mine a thoroughly good trial; and judging from from what had already been done, he imagined before another half-year was past they would arrive at something very satisfactory indeed. It was impossible to say precisely when they would commence to make returns. They had now a good pile of lead on the floors, and a large extent of ore ground was being opened out. There was one satisfaction in lead mining—that a fair price could always be obtained for the lead. The price was rather low now, though there was reason to believe that it would rise again; but even at the present price there was no reason why this mine should not prove a success, the same as many others with which Mr. Kitto was connected. Referring to the expenses, he said they were kept at the lowest possible point consistent with due efficiency of working. The directors had the utmost confidence in the company, and would do their utmost to make it a success. In conclusion, the Chairman moved the adoption of the report and accounts.——Mr. BOWMAN seconded the resolution.

Mr. KITTO, in answer to Mr. BROOKS, said the south lode was from 8 to 12 feet wide, and the distance between the two south lodes was between 40 and 50 fms., which would be driven in about 10 months. A great deal of work had been done in and upon the mine for the amount of money spent.

Mr. BOWMAN: And, judging from what I saw there, the work was well done.

Mr. POWELL: Have you any difficulty in getting miners?——Mr. KITTO said there was no difficulty whatever in getting miners at about 20*s.* and 21*s.* per week.

The CHAIRMAN said a report had been handed in by Mr. Walter Eddy, who inspected the mine at the request of a shareholder, and that report was of a satisfactory character, and confirmed all that Mr. Kitto had stated.

Mr. BOWMAN (a shareholder) said he had visited the mine since the last meeting, and was exceedingly satisfied with what he saw. The water coming from the 67 west was certainly coming over a bed of ore of some kind or another, probably lead. The cross-cut south was also an interesting point, but, of course, they could not expect much from there for eight or ten months. The whole development had been carried on in a straightforward and miner-like manner.

Mr. BOWMAN, in reply to Mr. ROSS, said he was perfectly satisfied with the improved condition of the mine during the last twelve months; he was perfectly satisfied with his investment. He had no doubt the mine would further improve. He had no doubt that in the westward, in the 67 fm. level, they would find a discovery which would satisfy everybody. There was no mine in the neighbourhood which presented a sounder position.

Mr. KITTO said the 35 fm. level west had improved since the date of his report, and was now yielding very good branches of ore, and this was quite in accordance with his own anticipations.

The CHAIRMAN said that was one of the most satisfactory features they had heard yet. (Hear, hear.)——The report was then put to the meeting and adopted.

The auditor—Mr. J. Killingsworth—was then re elected.

Mr. BEDFORD moved a vote of thanks to the Chairman for his able conduct in the chair, and to the directors generally for the manner in which they had conducted the affairs of the company. He was exceedingly pleased to hear that there was ample capital to carry on the works, because then it was not necessary to pick out little bits of ore for the purpose of gratifying shareholders with dividends, and so not opening the mine in a proper way. He attached considerable importance to the south lode, because in that district where several lodes ran parallel to each other good results might be expected, as in the Lisburne, Grogwinion, Cwmystwith, and other mines. He thought the shareholders had reason to congratulate themselves upon having a good property, and also upon the excellent way in which it was being developed. (Cheers.)

The resolution was carried, and the CHAIRMAN acknowledged the compliment.

The SECRETARY stated in reply to a question that there was an ample security in the hands of the trustees for all the guaranteed dividends, at the rate of 10 per cent., and that they would be paid half-yearly, at the company's bankers, as before.

A cordial vote of thanks was then passed to Mr. Kitto, and the meeting then broke up.

SOUTH WHEAL FRANCES MINING COMPANY.

The six-monthiy meeting of adventurers was held at the mine, on Tuesday, Mr. S. ABBOTT in the chair.

The statement of accounts showed a loss on the six months' working of 1576*l.* 19*s.* 8*d.*, and a debit balance to be provided for of 1916*l.* 11*s.* 11*d.* The agent's report referred to the various points of operation, and to the damage and loss sustained by the choking of Wheal Basset adit, and the overflow of water into South Wheal Frances from that unfortunate circumstance. In consequence of this untoward event the mine was under water for 14 weeks, the consumption of coals was almost doubled, and at the same time they were compelled to buy 40 fms. of new pitwork and 140 fms. of new iron rods for the 104 fathom level, which involved a heavy outlay, hence the merchants' bills charged are excessively heavy. Coals and new pitwork amount to more than 900*l.* However, by postponing the meeting for eight weeks they have in some measure improved the position, as a loss of about 2200*l.* would have been shown against 1600*l.* now shown. In a period of nine weeks they have raised and sold upwards of 43 tons of tin, which has reduced the balance that would otherwise have been shown against the mine of 600*l.* This, under the circumstances—at the present low price obtained for tin—is somewhat gratifying, as it shows that the returns are quite equal to the cost incurred. The mine continues to look well, and, with anything like an ordinary price for tin, good profits could be made.

The CHAIRMAN remarked that the accounts were so far satisfactory and encouraging that they had returned a larger quantity of tin from the mine than for a great length of time past. The 43 tons which appeared in the accounts had all been raised within a period of about nine weeks, so that they had no less than 15 weeks actual dead cost out of the 24, without being able to make any returns whatever. During that period also there were very heavy charges incurred in the shape of a renewal of pit-work and sundry other necessary matters, which had not only increased their labour cost but their merchants' bills as well, so that although the loss was apparently a heavy one it was clearly accounted for. Their prospects, however, he was bound to say, were most encouraging.

Capt. JAMES, in reply to Mr. Sparks, said that he could not exactly state the South Frances cost per ton for raising tin and preparing it for market, but the 43 tons last sold left them a profit of about 600*l.*

The CHAIRMAN stated that the merchants' bills were charged up to the end of April only, but with that exception he believed all their liabilities were charged up. It was estimated that 1200*l.* was required to make the adit efficient, and a letter from Mr. Basset's steward, Mr. Bolden, stated that Mr. Basset was willing to subscribe a quarter part of the estimated 1200*l.*, and suggested that no time should be lost in soliciting the support of the others interested, that the work be let by contract, and be completed within a given time.

The report and accounts were passed, and a call of 8*s.* per share was made to meet the existing deficit.

Capt. WILLIAMS remarked that there were 548 relinquished and forfeited shares which were the property of the company, and it was not improbable, seeing the present position and future prospects of the mine, that these shares might be sold at an enhanced price, and thus help materially to put the mine in a sound financial position.——The PURSER suggested the appointment of a committee to confer with the committee of Wheal Basset on the subject matter of their letter.——Capt. WILLIAMS said if this were done they ought to know what the plans and intentions of the Wheal Basset executive were before they resolved upon any definite course of action. The existing adit was so positioned that in two hours Wheal Basset could flood South Frances on any day in the week, and although he admitted that the committee of that mine were placed in unfortunate circumstances, yet it was not a courteous or neighbourly act that they should dam the adit and drown South Frances without a word of warning or intimation of their intention, although they met Capt. James on the very day that it was being done. In his opinion it was an unjustifiable and an illegal act, and the only defence which they set up was that there was a long-standing grievance between the two mines in consequence of South Frances having failed to pay a bill of 87*l.* alleged to be due to Wheal Basset. The whole of this matter ought to be investigated. The adit level of Wheal Basset and South Frances was brought up to a point where neither of the two mines had any right. But by sufferance it was brought up to the boundary of Wheal Basset sett, and many years ago one piece, which was in neither of their rights, collapsed, and was repaired and paid for jointly by the two mines. He said he would not contribute a single penny unless the adit was placed in such condition as to prevent a recurrence of the unfortunate state of things of which they had had so much cause to complain, and if a committee were to be appointed, in accordance with the suggestion of the Chairman, he thought they should be empowered to ask the committee of Wheal Basset what they intended to do with the 1200*l.*, and also to lay down a plan and a scheme for driving the adit. The committee of South Frances would then see how far the scheme was one which commended itself to their approval, and they could then decide whether they would contribute towards the cost or not.

Capt. JAMES explained that the bill to which Capt. Williams had referred was not presented to the shareholders, because Mr. Penrose and himself considered that it was simply preposterous, and consequently they did not take the slightest notice of it. The repairs to the adit in Wheal Basset were done while he was the manager of that mine, and were carried out by his orders and under his immediate superintendence, and he knew that at the time when this was done there was not the slightest notion that South Frances was to be called upon to contribute a solitary farthing towards those repairs. It was on this account that Mr. Penrose and himself determined to take no notice of the bill when it was sent in. The law in the parish of Gwennap, and he believed in almost every mining district in the country, was that every sett was supposed to keep the adit in a thorough state of repair within its own immediate boundary. At the same time they must have the use of the adit, otherwise they would have no drain for their water, and seeing that the adit in Wheal Basset had collapsed, and that a side tie was about to be driven, he thought it would be wise on their part to contribute towards its support, provided the executive of that mine complied with any reasonable conditions that might fairly be demanded of them—that the adit should not only be repaired in the central part of their mine, but should be extended to the South Frances boundary. They (South Frances) could then put their adit in a thorough state of repair from the Boundary shaft to Pryor's shaft, which they were unable to do under present circumstances. If Wheal Basset complied with those conditions he did not think there would be any difficulty in coming to an amicable and satisfactory arrangement.

Capt. WILLIAMS regarded the offer of Mr. Basset as a very handsome one, and thought the other lords interested in the matter should be asked to contribute towards the expense. They might then put the adit in a permanent state of efficiency, and the cost would not bear unduly upon any single party. It should be part of the duty of the committee to ascertain whether the other lords would contribute their proportion of that cost. Mr. Basset during the depression had behaved in a very noble manner, and if other lords in the county would only follow his example there would be a much larger amount of energy, perseverance, and capital brought into the county for the development of their property.

The purser, manager, and Messrs. Dingle and Williams, were then appointed as a committee to consult with the executive of Wheal Basset, and some formal business having been transacted the meeting separated.

ROMAN GRAVELS MINING COMPANY.

The general meeting of shareholders will be held at the offices, on July 4, when the following report will be presented:—

The balance-sheet will show that during the 12 months ending Feb. 28, 2356 tons of lead ore and 40 tons of blende have been sold, realising 35,620*l.* 6*s.* This, although not quite equal to their anticipation, is something in excess of the previous year, when 2344 tons of lead ore and 30 tons blende, realising 35,244*l.* 1*s.* 6*d.*, were sold. The sales upon this occasion are given in detail, and it may be well to note that eleven sales only were made, against 12 months' costs, which have been much heavier than usual, amounting to a total of 18,622*l.* 6*s.* 10*d.* This amount includes a large outlay for works of a permanent character, and the purchase of a powerful engine and machinery—for the former 1772*l.* 9*s.* 9*d.*, and for the latter 1739*l.* 0*s.* 1*d.* The other items in the accounts are of the usual character, and require no comment. After the payment of the dividends in June and October last (absorbing 10,391*l.* 5*s.*) there remained at the close of the financial year a disposable balance of 5691*l.* 1*s.* 9*d.*, from which the directors felt they were fully justified in declaring a third dividend of 5100*l.*, when the unexpected return of acceptances of one of their largest purchasers, reducing the available balance by 1697*l.* 17*s.* 6*d.*, rendered it necessary to postpone the distribution of profits. A supplementary balance-sheet, made up to within a few days of the meeting, will be prepared and laid before the shareholders.

Since the conclusion of the financial year in February last, the company has passed through a period of comparative adversity, which brought about by causes wholly outside the control of the directors and managers, has yet, by some shareholders, been reflected upon the management. Had attention been given by the complaining shareholders to the weekly reports published in the mining papers, the various causes which have contributed to this state of things would have been understood, and not a little unjust censure would have been withheld.

It may be well to recapitulate the causes to which your directors here allude, though they are known to the majority of the shareholders. Through the failure of the Burry Port Smelting Company, your company sustained a direct loss of nearly 1700*l.*, and indirectly a considerable further loss: for the demoralisation of the lead market, caused by the financial difficulties of this firm, has, in conjunction with the restricted trade of the country, caused a fall in the price of lead ore of at least 2*l.* per ton. The position of the company has been further affected, and to a greater extent, by a third cause, to which all mining enterprises are liable—a

falling off of the returns. It is needless to say that the ends have during the past six years varied in productivenes, and Capt. Waters states that in more than one instance many of the ends have been simultaneously poor, but have improved again, and returned to at least their former richness. The directors are happy to be able to direct attention to the agent's report, from which it will be seen that this is again occurring, and is noticeably the case with the 65, south of Stokes' winze, which has improved from 10 cwts. to nearly 3 tons per fathom since his report was written. Since the last general meeting Mr. Stephen Olding has joined the board, in the room of Mr. Robert Oldrey resigned. In accordance with the Articles of Association, Mr. William Greame retires from the direction, and Mr. Peter Watson from the auditorship of the company, but offer themselves for re-election. The exhaustive report of Capt. Arthur Waters enters fully into the present position and future prospects of the mine.

NEW SOMBRERO PHOSPHATE COMPANY.

The half-yearly general meeting of shareholders was held on Wednesday, at the City Terminus Hotel, Mr. H. P. STEPHENSON, the Chairman, presiding. In moving the adoption of the report, which was taken as read, the Chairman called the attention of the meeting to its principal features. The defendants in the Chancery suit had presented a petition of appeal to the House of Lords, and the Court of Appeal stayed the proceedings on the defendants undertaking to pay into Court, on or before the 9th inst., 50,658*l.*, and transferring 4816 shares in the company into the joint names of the Chairman of the company and Mr. Bischoff, not to be dealt with till after the judgment of the House of Lords. The sum of money mentioned had been paid into Court, and the transfers for 4816 shares were in the office of the solicitor, executed by the members of the syndicate, and only waiting for his execution to be transferred into the joint names of the company to await the decision of the House of Lords, so they had so far advanced another step in "this most protracted arrangement." He hoped that after the November meeting of the Law Courts they would have this case heard, and that by the end of the year they might be able to meet and congratulate themselves that this protracted litigation was at an end, and that they would receive that reward in the shape of compensation to which they were justly entitled. The interest on the amount of money awarded to them by the Court of Appeal was running on, and that which he previously intimated to them was approaching 12*l.* a share (as the value of the share) was now running on towards 13*l.* They had made a profit on the working of the island of about 2533*l.* during the existing half-year, and according to appearances that amount was likely, certainly for the present, to be continued. Very great care was taken in the selection of the stuff, and it kept up a very fair percentage of phosphate.——Mr. H. B. MARSHALL, the deputy-Chairman, seconded the adoption of the report, which was at once carried unanimously.

FOREIGN MINING AND METALLURGY.

Some small orders have been received by the French iron trade, but they are only small ones. In the Nord prices are firm, there is a sufficient amount of work on hand, and the state of affairs is as good as could be anticipated under all the circumstances. In the East of France the pig-iron trade has experienced a sensible revival, sufficient orders being on hand to assure employment to the works for several months in advance. At Paris iron quotations have been firmly maintained, transactions are tolerably regular, and thanks to the activity of the building trade and to the Universal Exhibition of 1878 there is a fair amount of employment on hand. The managers of the Creusot works have formally contradicted a statement that they have accepted an order for 20,000 tons of rails on Russian account. The Protectionist policy pursued by Russia has a virtually prohibitory effect as regards the importation of French rails into Russia. M. Verdié, director of the Firminy Steel Works, is about to establish steel works at Domdrowna, in Russian Poland. In the Loire industrials are not so well contented as in the Nord; large orders still make default in the Loire basin.

A contract has just been let at Amsterdam for the delivery of 20,000 iron sleepers to the Netherlands State Railways. Three Belgian firms—the Marcinello and Coullet, the Sclessin, and the Monceau-sur-Sambre—took part in the competition; but one German works—the Phœnix, at Caar, near Ruhrort—carried off the contract. The price named in the accepted tender was 6499*l.*, the 20,000 sleepers weighing about 8000 tons. It should be observed, however, that the sum named in the contract comprises the delivery and laying of the sleepers, so that the price of the sleepers at the German works may be estimated at about 5*l.* per ton. The Monceau-sur-Sambre Company came very near the accepted tender, the difference having been only 32*l.* The sleepers to be laid on the Netherlands State lines are on the Vautherin system, 10,000 of which were recently tried on the Belgian State system and rejected after a careful trial. It is, perhaps, a little strange that the Dutch authorities did not take account of this circumstance. It is stated that the Great Central Belgian Railway Company contemplates a total discontinuance of wooden sleepers upon its system. The Belgian works are not without current orders; the founders alone make some complaints, a sensible check having been experienced in the demand for castings. Contracts are about to be let at Berlin for 90 passenger carriages, 600 goods vans and trucks, 30 passenger engines, with tenders, and 27 goods locomotives with tenders.

There is not much to report with respect to the French coal trade. A strike has occurred at the Mæux Mines, in the Pas-de-Calais; troops were forwarded to the spot, and some arrests were made, but everything passed off quietly after all, and the strike appears to have now terminated. A reduction in wages was the apparent cause of the strike. Fine weather has slightly revived the hopes entertained with respect to the crop of sugar beet, but these hopes are very vague at present; upon the whole, the feeling prevailing is one of rather more contentment. Belgian coalowners have been delivering coal in France upon rather cheaper terms, and English competition has been naturally checked in consequence. No intelligence of interest has reached us from the basin of the Loire.

Some orders for coal have been received in Belgium which are said to be the immediate consequence of the strike in the Newcastle basin, but this fact, while it is perhaps worth noting, has not much effect upon the current Belgian coal season as a whole, which is regarded as much compromised. A Spanish budget commission has approved the imposition of an *ad valorem* duty of 15 per cent. on foreign coal imported into Spain.

Business in copper has been quiet at Paris; quotations have remained rather weak, but without change. Transactions upon the German copper markets have been inconsiderable, but prices have been maintained at about their former level. Tin quotations have been firmly maintained at Rotterdam, as holders have exhibited no great disposition to sell. For disposable Banca 42¾ fls. has been paid; holders are standing out for 43 fls. Disposable Billiton has been held at 41¾ fls.; ditto, with delivery in July, at 41½ fls. There has not been much doing in tin at Paris, and prices have been feeble. The German tin markets have been generally rather firm. Transactions have been unimportant, and prices have scarcely varied. There has not been much change in lead at Paris. The German lead markets have also not experienced any material variation. There has not been much business passing upon the Paris zinc market; Silesian, delivered at Havre, has made 21*l.*; ditto, other good marks, 20*l.* 16*s.* per ton. At Marseilles, rolled Vieille Montagne zinc has brought 28*l.* per ton. The German zinc markets have been quiet.

THE CHANNEL TUNNEL.—The association for constructing the sub-marine tunnel between England and France held a meeting in Paris last week to hear a report on the geological explorations and soundings executed last year. The account given stated that the surveys were made througout the zone in which it is proposed to pierce the tunnel, and which consists of a bed of clay perfectly continuous and homogeneous, and that the excavation may be made between the two shores through the same chalk system. The engineers are now as certain as possible that the execution of the tunnel is quite practicable. They have already fixed on the exact spot for the shafts for bringing up the chalk excavated, and the direction of the gallery for carrying off the water infiltrated. The construction of this gallery for a short distance will permit them to obtain an absolute certainty of the conclusions drawn from the geological study of the surface of the chalk.

PHOSPHOR-BRONZE.—The proprietors of the Graupen Tin Works, in Bohemia, have lately supplied, for the manufacture of phosphor-bronze, a compound of phosphor with tin, which, having the highest possible proportion of phosphorus, does not give up phosphorus, even in repeated melting. In the alloying of copper with phosphor-tin no other precautions need be observed than in preparation of ordinary bronze. As the different properties of phosphor-bronze depend on the proportion of tin and phosphorus the phosphor-tin is furnished in two sorts, with different proportions of phosphorus—No. 0 with 5 per cent., and No. 1 with 2½ per cent. These two kinds suffice to produce the greater part of all the compounds in demand. For quite special cases, however, the Graupen Works supply tin with 5 per cent. By using the Graupen phosphor-tin, phosphor-bronze will be produced about 40 per cent. cheaper than hitherto, while ordinary bronze is only 8 per cent. cheaper than the phosphor-bronze made with phosphor-tin.—*English Mechanic.*

FOREIGN MINES.

ST. JOHN DEL REY MINING COMPANY (Limited).—Advices received May 31, 1877, ex Guadiana (s.), dated Morro Velho, May 1:—

GOLD EXTRACTED TO DATE.—The produce for the second division of April, being a period of 11 days, amounts to 13,570·5 oits. It has been derived as follows:—

	Oits.		Tons.	Oits. per ton.
General mineral	5,660·5	from	1075 =	5·265
Mineral roughly freed from killas	6,207·0	,,	750 =	8·276
Mineral treated at the Cotesworth stamps	569·8	,,	151 =	3·773
	12,437·3	,,	1976 =	6·294
Re-treatment	1133·2	,,	— =	·573
Total	13,570·5	,,	1976 =	6·867

Equal to ..... 1564·456 ozs. troy.

The foregoing gold return, though not showing as good a standard yield as was obtained during the first division of the month—7·343 oits. per ton, notwithstanding gives a better daily gold return from the mineral treated. It may be observed that the general mineral gave a higher yield 6·085 as compared with the present 5·265, while the separated poorer mineral in the first division gave only 2·690 oits., now gives 3·773 oits. This arises mainly from the separation of the mineral not having been so well effected. The produce per diem for the first division was at the rate of 1096 oits.; per diem for the second division was at the rate of 1230 oits.

The stamping mills have a full supply of about the same quality of mineral to reduce to the end of April.

Advices received June 14, 1877, dated Morro Velho, May 18:—

GENERAL OPERATIONS.—The general operations of the company since May 1, when I had the opportunity of addressing you, have been carried on steadily, without any interruption. In the mine there has been a full force for the execution of the work there, and at surface the weather has been favourable, having a good supply of water at the same time to drive the machinery at the desired speed. The roads are in fair condition, and timber is being brought in on an increased scale from the more distant woods.

There is a very good supply of provisions in this district at present, nearly the whole of them at comparatively moderate prices.

MINE DEPARTMENTS.—During the first two weeks of May the force—both of natives and blacks—in this department has been sufficient to occupy every desirable point for carrying on the sinking, stoping, and timberwork.

The following shows the attendance and the duty performed:—

Mineral quarried, hauled, and delivered at surface	3654 wagons.
Average attendance of natives daily	175
Average attendance of borers daily	119·14

Duty equal to 30·67 wagons per borer for the 14 days, or daily 2·19 per borer, which is large duty.

The pumps continue to work steadily, and the accumulated water in the old mine having been now entirely drawn off to the level of the upper cock, the pump is being driven slowly, as there is not sufficient water in the mine at present to give a full column of water when the wheel goes above four revolutions per minute.

The timbering of the levels injured during the heavy rains is still being continued, the greater part of that going towards Timbuctoo has been renewed, having reached under the south-west corner of the Fuba mill, which we may now consider as safe.

PRODUCE FOR THE MONTH OF APRIL.—The gold extracted during the month of April amounts to 35,968·7 oits. It has been derived as follows:—

	Oits.		Tons.	Oits. per ton.
From general mineral	15,162·3	from	2712 =	5·590
Mineral roughly freed from killas	16,355·3	,,	1934 =	8·456
Poorer mineral treated separately	1,264·8	,,	365 =	3·465
	32,782·4	,,	5011 =	6·542
Re-treatment	3,186·3	,,	— =	·636
Total	35,968·7	,,	5011 =	7·178

Equal to ..... 4071·4411 oz. troy per ton.

The foregoing produce, which is for 30 days of April, is 6690 oits. more than was extracted in the 31 days of March. The yield in March was 5·329 oits. per ton, and in April, as may be seen above, 7·178 oits. per ton.

This increased produce arises from raising more of the better class of mineral in the eastern section of the formation, and less of the poorer talcose and killas material we have had such a large proportion of lately in the western part of the formation drawn by the B kibble. That kibble will now be supplied more from mineral in the eastern part of the excavation, not only above from section 216 but also from the lower horizon of mineral eastward, where a new sollar has just been completed in that part of the mine, from which the B kibble will in future be able to draw a certain amount of good mineral.

COST AND PROFIT.

The produce for April being ..... 35,968·7 oits.			
Deduct loss melting into bars ..... 124·8 ,,			
35,843·9, at 7s. 9d. per oit. =	£13,889	10	3
Cost	6,956	17	0
Profit for the month of April	£ 6,932	13	3

The cost for the month of April is 81*l.* higher than was incurred in March. This increase has arisen chiefly in material log timber for the mine, an increase of about 400*l.*, and in wages, having three fortnightly payments to blacks in April, European salaries 180*l.*, and extra expenses in Rio for duties, &c., about 240*l.*

Taking into consideration these increased items of outlay, the profit realised on the working for the month of April may be regarded as satisfactory.

REDUCTION DEPARTMENT.—The supply of mineral has been steadily delivered on the spalling-floors during Aptil. The duty of the stamps has not been quite so large as in March, when 5491 tons of mineral were pulverised, but that received and treated in April had more hard and pure mineral, and less soft talcose material and killas, hence the smaller number of tons pulverised in April.

The quantity of sand amalgamated amounted to 6464 cubic feet. It yielded at the rate of 5·146 oits. per cubic foot.

The stamping-mills have been kept regularly at work, excepting when stoppage for necessary repairs became imperative.

The arrastras have worked nearly full time, the Prala ones having worked 29·51 out of 30 days.

The amalgamation process has worked with regularity, and the sand, as a whole, amalgamated readily, though the loss of quicksilver is rather heavy, amounting to 252 lbs.

GOLD EXTRACTED TO DATE.—The produce extracted during the first division of May, a period of eight days, amounts to 10,848·9 oits. = 1227·6447 ozs. troy. It has been derived as follows:—

	Oits.		Tons.	Oits. per ton.
From general mineral	4601·5	from	740 =	6·218
Mineral free from killas	4787·5	,,	512 =	9·311
Poorer mineral treated separately	353·8	,,	83 =	4·262
	9722·8	,,	1335 =	7·283
Re-treatment	926·1	,,	— =	·693
Total	10,648·9	,,	1335 =	7·976

The above is the best gold return per diem that we have extracted for some time, being at the rate of 1331 oits. daily.

The standard yield being 7·976 oits., and the mineral freed from killas giving 9 311 oits. per ton from the mineral treated, shows what the ore will give when fairly freed from the incubus of slatey and inferior mineral. The improved produce, as previously stated, arises from having raised more mineral ore and less killas during the above period.

There is a stock of mineral on the floors, and we have a fair water supply for working the mine machinery and the reduction works, so that there should be good produce extracted from our present supply of mineral.

The following telegrams have been received:—

On May 22, dated Rio, May 19 and 21, and Morro Velho, May 12 and 16—"Produce eight days (first division of May), 10,750 oits. Yield, 7·8 oits. per ton. Profit for the month (April), 6900*l.* All going on well. The cost being, from exceptional circumstances, 800*l.* above the average."

On May 30, dated Rio, May 29, and Morro Velho, May 24—"Produce twelve days (second division of May), 14,250 oits. Yield, 7·8 oits. per ton. General work going on well, and satisfactory progress being made."

On June 12, dated Rio, June 11, and Morro Velho, June 6—"Produce for month (May), 39,000 oitavas. Yield, 7·8 oitavas per ton. General work progressing favourably."

On June 19, dated Rio de Janeiro, June 18, and Morro Velho, June 12:—"Produce eight days, first division of June, 10,750 oits.=4165*l.*; yield, 7·5 oits. per ton. General work progressing favourably.

DON PEDRO.—May 24: The ores have been extracted chiefly from No. 5 and No. 8 shoots, only a small quantity having been taken from No. 6 shoot. General work is of a fair standard. No. 1 stope, in No. 8 shoot, has again improved, the line becoming more defined, which now yielded fair general work. The other parts of this shoot are being carried on without change to note. From the driving south of vertical rise, on No. 6 shoot of lode, at the horizon of Alice's, was resumed on the 18th, to be continued across the old excavations to prove the southern ground. We also commenced to drive north from vertical rise, which is exploring the No. 5 shoot. The rise from the Canoa, to explore for the underlie lode, is being contenued, but up to date no discovery made.—Drainage: The re-opening of the incline shaft is being kept on at intervals only, owing to the surface water falling off a little.—Prospective and Running Work: The timbering of new level from the adit is being continued satisfactorily. The driving from the 30 towards the Canoa is still hard for excavating. A force is employed repairing incline from adit to Symons's shaft. The repairing of Vivian's shaft and all other running work is being kept on.

— Capt. Vivian, May 24: Mine—No. 1 Stope, No. 8 Shoot: Referring to my letter of the 10th inst., I am happy to say that, as anticipated, the lode has again improved, and is now large and well defined, yielding general work of good quality; but no boxwork has yet been met with, although the gold throughout the vein has a very strong appearance. Should any further improvement take place, which may happen at any moment, I will advise you per cable. There is no other particular change in the mine calling for special remark.

CONDES COMPANY OF CHILI.—Telegram from Valparaiso: 23 tons of regulus and 7 tons of raw ores have been shipped per Cotopaxi: 500 tons of ores (including fluxing ore) are at Corral Quemado intended for smelting. The fluxing ores on hand are sufficient, and the produce will come forward without delay.

OREGON.—Telegram from Mr. F. Ennis: Just completed another clean-up—Gross returns, $1600; gross expenses, $900.

CEDAR CREEK.—T. B. Ludlum, May 26: I last had this pleasure on the 16th inst., since when I have no change to report worthy of note. Our upper ditch is still conveying nearly its full capacity of water, all of which is being utilised. The Baker claim continues washing nine hours per day, and is removing the gravel quite rapidly, considering the nature of the material. The Star and Union also continues washing as last reported.—Pacific Claim: Owing to the close proximity of the reservoir of the Miners' Ditch Company, we were able to wash but little off the high point of promising gravel which we expected to draw in last run, and we were obliged to content ourselves with working off some ridges and peaks of gravel left by our predecessors. The proceeds of this last run were small, but I am not yet in receipt of the returns, consequently cannot give the result. In the Central claim I am using a small quantity of water washing off the tailings overlying the old Sarson's sluice mentioned heretofore. Our water customers are all under full headway, and are anxious to have water as long as possible.

ARGENTINE.—Capt. Coward, May 1: Mines: The stopes in No. 2 cano are not looking so well.—Pique: The 44 north, towards Cano Largo, is being worked night and day by six men, Sundays included. Stoping in the bottom of the 44 is splendid lode, and every appearance of continuance. Shaft in silver lode.—Colonel Section: Resumed sinking to command ore in two canos below it, recently discovered.—Captain Section: The 20 cross-cut driving by six men all the time, same as Pique 44 cross-cut north. At all other points no change to notice. Full details in monthly report next week.

— Telegram, Monte Vidio, June 19: 20 days stamping, 500 tons treated, 175 ozs. cleaned up. Oxland's calciner has commenced working. It is too early to report definitely, but it seems to be answering well.

NEW ZEALAND KAPANGA (Gold).—Telegram received from Captain J. Thomas:—"Since my last message we have driven No. 5 towards the Albion shute of gold 20 ft. We are continuing the stope in the back of the No. 6 south, and sinking the winze below the same level. Prospects good. Ore crushed 40 tons. Return of gold 20 ozs. Ore raised 40 tons."

— J. Thomas, May 5: In the 60 fm. level, during the past four weeks ending the 5th inst., No. 6 level has been driven south of the winze on the course of the lode 4 fathoms, and the lode has enlarged from 2 to 4 and 5 ft. wide; it consists principally of veins of quartz, highly charged with ribs of black metallic pyrites, this class of pyrites being a sure indication to accompany gold. The quartz veins and "vogues" being embedded in a soft blue kindly flookan or killas, which is also full of very fine dense pyrites, containing a small proportion of fine loose gold. The footwall is soft, and good for making progress, and the hanging-wall is the usual regular and hard elvan of this country, branches and stringers dropping from the lode, and coming in contact with the elvan make very rich bunches and patches of gold quartz, specimens of the same character as I have forwarded to you. I have broken out some good specimens occasionally. The general lodestuff has not yielded in crushing so good as where the lode is smaller. I have never seen the lode here look so strong or full of minerals for producing gold as it is at this time. In the 50 fm. level No. 5 level has been driven a further distance north on the course of the lode, towards the Albion shoot of gold ground, 12 fms. 4 ft. For the past month this end has been driven through a blank piece of non-auriferous ground, between the Coromandel and Albion belts or shoots of gold-bearing ground; the lode is regular, though of small size, and the hanging-wall and soft footwall keep their regular course. We have crushed about 50 tons of quartz the past month, the general lodestuff without selection, which shows for a yield of ½ oz. of gold per ton, and additional 15 lbs. weight of specimens have also been raised, making about 35 lbs. on hand, which should yield 1 oz. per pound. I have put a pare of men to stope on the lode in the back of the 50 fm. level, a few feet north of the winze, on a likely-looking piece of ground. The water used for stamping is the shaft water, which runs to a reservoir; this reservoir is not large enough to hold sufficient water to crush for 12 hours, and I am now making it larger, so as to contain the required supply to keep the stamps going with the increased supplies of quartz from underground. All branches of the works are going on most regularly, and am in hourly expectation of striking something good in the bottoms.

EXCHEQUER (Gold and Silver).—Lewis Chalmers, May 26: The box of ore which I am sending to Professor Price has not yet arrived. I leave here by the 4 P.M. train for the mines. I enclose the foreman's report for May 23, which is as follows:—"I will ship per express to-morrow morning a box of ore from the same place that the piece came from which I sent you the evening before you left. You requested me to let you know the extent of this ore; that would be a difficult matter to do. The ore body on the stope is, I think, quite extensive, and is from 18 inches to 4 feet in thickness; there is plenty of the same sort of ore ready to be extracted when you get to take it out."

I.X.L. (Gold and Silver).—No reports have been received this week, owing to the manager's absence in San Francisco.

SANTA BARBARA (Gold).—Mr. Hilcke, Pari, April 14: During the month of March 885 tons of mineral were stamped, and the sand of 1317 tons in all was treated, yielding 3·175 oitavas per ton, or a total of 4182 oitavas of gold, which valued at 8s. 6d. per oitava, amounts to 1777*l.* 7s. as the estimated value of the produce for the months of February and March. The mines working costs for the same two months, including all the extra outlay for materials, labour, and cart hire in reconstructing the damaged water courses, &c., amounted to 2054*l.* 9s. 7d., thus showing on apparent loss of 277*l.* 2s. 7d. for this period. Besides the heavy outlay for the restoration of the surface works, the high prices of provisions had increased the cost, and more labour being required at surface had told against the output of ore from the mine. No expenditure was incurred on capital account: 25 tons of mineral remained unstamped on March 31. The quantity of ore raised during March amounted to 937 tons. Ore raised in February and March 1925 tons, rejected as refuse stone 583 tons, stamped 1317 tons, leaving 25 tons of good ore on hand. Average quantity of ore raised per borer for March, 23·5 tons.

BENSBERG.—C. Craze, June 18: Victoria Shaft: We are still cutting through the lode at the 22, west of shaft, which is very hard as I spare for driving; up to the present we have cut into it fully 6 ft., with no indications of the north wall—for the whole width driven it contains good patches of lead ore and blende, and the fine appearance of the forebreast to-day indicates (to my mind) a still better part before us. We shall push on this point with all possible energy until we meet with it, or the north wall. In the 22, east of this shaft, we have also commenced to cut north, as we have indications that the main part is in that direction. I have to-day broken some good stones of lead in the north side here. There is no change in the 14, east of shaft, since my last. In the winze being sunk under the 14 west we have at present indications of a better part of the lode coming in again under the slide I referred to last week; at present it has a very kindly appearance, but I shall be able to say more about this in my next report. The lode upon the slide in the western end of the winze is worth fully 1 ton of good lead ore to the fathom. The water in the mine has fallen off a little in the past week; the engine is now going 12 strokes per minute. We have not yet met with anything of value in the trial pit to the east of open-cast, but the rock we are in looks like being near the lode, and there are some spots of lead in it. There is nothing else calling for remark at present.

For remainder of Foreign Mines, see to-day's Journal.]

Registration of New Companies.

The following joint-stock companies have been duly registered:—

HULTAFALL MINING COMPANY (Limited).—Capital 60,000*l.*, in 5*l.* shares. To acquire certain mineral properties according to the terms of an agreement between Joshua Maxfield of the one part and W. J. Lavington on behalf of the company. The locality is not given. The subscribers (who take one share each) are—G. R. Hearn, 73, Park-road, Penge, accountant; M. F. Dormer, 31, Balham-crescent, Balham, clerk; F. F. Bennett, 1, New Broad-street, accountant; C. H. Crossley, St. Bartholomew-road, Tufnell Park, stock and share dealer; W. Burley, Fern Villa, Plumstead, engineer; F. F. Powell, Stock Exchange, stock jobber; E. R. Gabbott, 51, Threadneedle street, stock and share dealer. The directors are—Messrs. J. Maxfield, H. Bradwell, John Maxfield, George Batters, and Major Huddlestone, the qualification being the holding of 50 shares. The remuneration is to be 400*l.* per annum, but if a dividend of 50 per cent. be at any time declared the remuneration is to be 1000*l.* for that year.

HUGHES LOCOMOTIVE AND TRAMWAY ENGINE WORKS (Limited).—Capital 100,000*l.*, in 10*l.* shares. To take over the business of Messrs. Henry Hughes and Co., of Falcon Works, Loughborough, Leicestershire. The subscribers (who take one share each) are—W. Barfoot, Leicester; A. R. Robinson, Derby; T. M. MacKay, 1, Leadenhall street; J. M. Gillies, Ravenstone House, Upper Norwood; Sir Wilford Brett, Esher; W. Hughes, Loughborough; Clement Stretton, Leicester.

HOUSE OWNERS TRUST (Limited).—Capital 100,000*l.*, in 5*l.* shares. To buy and sell houses and land, &c. The first seven subscribers (who take one share each) are—F. R. Chesney, 58, Netherson-road, West Kensington; N. V. Squarey, 22, Great George street, S.W.; John Emery, 28, Grays' Inn-road; Samuel Parnell, 1, Queen-street, Cheapside; J. M. T. Carr, 18, Warwick-street, Regent street; R. S. Gutteridge, Brook street, Grosvenor square.

BRITISH XYLONITE COMPANY (Limited).—Capital 50,000*l.*, in 10*l.* shares. To acquire the business of Messrs. D. Spill and Co., of Homerton, xylonite and ivoride manufacturers. The subscribers (who take one share each) are—F. M. MacKay, Leinster Gardens, W.; W. J. Ingram, 65, Cromwell-road, W.; H. J. L. Bennett, Chertsey; D. Spill, 124, High street, Homerton; E. L. Bennett, 20, Ryder-street, St. James's; J. A. Stirling, 34, Queen's Gardens, W.; A. D. MacKay, 27, Leinster Gardens, W.

HALIFAX COAL COMPANY (Limited).—Capital 10,000*l.*, in 5*l.* shares. To acquire mines and beds of coal at Sunny Bank, Southouram, Halifax, Yorkshire, and to work the same. The subscribers are—William Keith, Modside Villa, Halifax, pawnbroker, 40; T. Crabtree, West Hill, Halifax, no occupation, 127; T. Hargreaves, Park-road, Halifax, no occupation, 156; John Riley, Woodside, Hipperholme, spinner, 80; John Maude, West Vale, Halifax, manufacturer, 171; J. Horsfall, Fernside, Halifax, no occupation, 55; G. Watkinson, Woodfield, Hipperholme, near Halifax, woolstapler, 90; The directors are Messrs. Watkinson, Crabtree, Riley, Hargreaves, Keith, Horsfall, and Maude, the qualification being the holding of 25 shares.

D. NEW AND CO. (Limited).—Capital 150,000*l.*, in 10*l.* shares. To carry on business as ironfounders, toolmakers, &c., at Nottingham. The subscribers (who take 20 shares each) are—David New, Waverley House, Nottingham; Alfred J. New, Ruddington; Robert Evans, The Park, Nottingham; J. N. P. Cox, The Park, Nottingham; S. Thomas, Nottingham; R. A. Matthews, Nottingham; T. Dawson, Nottingham.

UNIVERSAL TRAMCAR COMPANY (Limited).—Capital 100,000*l.*, in 10*l.* shares. To adopt an invention of Joseph Apsey and P. J. G. Rouquette for improvements in steam tramcars. The subscribers (who take one share each) are—P. J. G. Rouquette, 35, Finsbury-crescent; J. S. Pierce, 21, St. John-street, Adelphi; J. Apsey, 22, Waterloo Bridge road; H. S. Rouquette, 35, Finsbury-circus; A. S. Mullins, Grenthorne-road, Hammersmith; C. J. Appleby, Southwark; Robert Payne, Lothbury, E.C.

NORTH OF ENGLAND SCHOOL FURNISHING COMPANY (Limited).—Capital 10,000*l.*, in 5*l.* shares. To acquire the business of the North of England School Furnishing Company (Limited), of Darlington. The subscribers are—W. C. Parker, Darlington, 40; S. Hare, Darlington, 40; T. R. Clifford, Darlington, 40; James Dodds, Darlington, 20; H. Pease, Darlington, 40; G. Marshall, Darlington, 60; H. Brooks, Darlington, 40.

FINE ARTS DECORATING AND STAINED GLASS CO-OPERATION ASSOCIATION (Limited).—Capital 5000*l.*, in 1*l.* shares. To advance ecclesiastical, palatine, and domestic decoration. The subscribers (who take one share each) are—C. F. Baker, 19, Clifton Villas, Maida Hill; J. P. Warrington, Heathdale House, Hamstead; G. Robinson, 4, Tennyson-road, Penge; F. W. Lewis, 9, Ellis-street, Chelsea; W. Douglas, Clapham-road; L. T. Chapney, 9, New Armond-street; C. E. Billings, Beddington.

REVERSIONARY AND GENERAL SECURITIES COMPANY (Limited).—Capital 100,000*l.*, in 10*l.* shares. To advance money on various kinds of securities. The subscribers (who take one share each) are—E. Bind, Oldford House, Brook Green; John Dent, Finchley Lodge, Blackheath; G. W. Rush, 2, Craig's court, W.C.; G. H. Hopkinson, 3, Regent-street; J. Mazio, Mansion House Chambers; E. Montennis, New Basinghall-street; J. B. Martin, 4, Paper Buildings, Temple.

BIRKDALE PUBLIC MARKET COMPANY (Limited).—Capital 5000*l.*, in 5*l.* shares. To construct a public market place at Birkdale. The subscribers (who take one share each) are—W. Penrose, Birkdale; R. W. Kettle, Southport; Frank East, Birkdale; S. Clegg, Rochdale; W. Woolhouse, Hayes, Freshfield; T. W. Hodge, Birkdale; W. H. Johnson, Southport.

TEMPERING IRON AND STEEL.

The principal feature of the invention of Messrs. DION and BAYLIS, of Chambly Basin and Montreal, Canada, is the arrangement by which the temperature of the bath or apparatus in which the article to be operated upon is dipped is always automatically kept at the same degree of heat. The furnace proper is in the usual way enclosed in brickwork, and within it is set a hot chamber or bath of molten metal or the like. The tempering chamber is placed immediately above this bath, completely or partially covering up a tank of water or other fluid. The part of the tank outside the chamber has an inlet for replenishment, and this tank is also arranged to form a seal to the external air. Within the tempering chamber is arranged mechanism which when put in motion dips alternately into each bath the plate or article to be tempered, at the same time closing up the bath which happens not to be in use. A pyrometer placed in a tube in connection with the hot chamber or molten metal bath carries on its outer end a pointer and dial to register the temperature, certain devices arranged for the purpose, and hereinafter described, operating when the heat of the chamber rises above a certain point to automatically cut off the blast from under the grate, and turn it above the fire till the heat of this hot chamber drops below the desired point, when the reverse action at once takes place, and the blast is turned under the grate. Wire is tempered by being drawn through a tube set in the hot chamber, whence it passes into a bath of oil, water, or other fluid without coming in contact with the external air; or this bath may be omitted, and the wire on leaving the tube come in contact with a blast of air driven by a fan.

The conversion of iron into steel can also be effected by the same invention. In its application to this purpose a metal chamber is employed of any size and proportion, and flanged so as to be secured to the brickwork enclosing the furnace, such chamber being provided with a door and lugs for convenience in fitting. Through the chamber passes transversely a shaft, which is carried out either on one or both sides, where it may be provided with a suitable handle for rotation. Upon this shaft are secured arms, the lower ends of which are enlarged, and have pinions formed upon them. These pinions intermesh with and work in racks formed on a plate to correspond with them, and thus give the plate a forward or backward movement on rails or slides arranged on a main plate or cover. Through eyes formed on the outer ends of the arms is a rod secured in any suitable manner against lateral movement, to which is hung loosely (so as to be always vertical whatever angle the arms may assume) a plate arranged to receive the article to be tempered, and which dips alternately in a hot chamber or bath (which may be filled with molten metal) and in a tank, the latter being arranged so as to project somewhat beyond the enclosure of the chamber first mentioned, and having there an open trough through which it may be replenished, an outlet pipe being also provided. The plate dips into this tank through an opening formed in the main cover, a diaphragm dipping down into the tank, and forming a perfect seal. The reciprocating plate above referred to is arranged to alternately cover the bath and the tank. The bath has its end extended so as to be built into the brickwork of the furnace, and is also provided with an opening communicating with the outside, and fitted with a suitable door, through which a rake or scoop may be passed to remove that part of the lead which has become oxidised. The furnace in which the bath is set is provided with bars arranged so as to be shaken or tipped at pleasure, and with an ash-pit and the requisite doors.

In order to ensure the uniform heating of the lead contained in the bath the products of combustion are preferably first taken up into a flue running along the back of the chamber, thence passing down through an extension and another flue on their way to the chimney, which may be placed in any convenient spot. Should, however, the size of the furnace be such as to give a heat which will not necessitate this, the products of combustion may be carried directly from the furnace to the chimney flue. Within the bath and stretching transversely through it from side to side, but not communicating in any way with its contents, is placed a cast-iron or other metal pipe, containing within it a rod in which is formed a groove. Along this the wire to be tempered passes, being unwound by any suitable means from a drum placed on one side of the furnace, and on leaving this it is taken down through a tub or passage into another bath, which may contain water, oil, or any other suitable fluid. On its exit from this bath the wire, which has as yet not come in contact with the external air, is wound up in any usual manner upon another drum. In lieu of the arrangement above described the latter bath may be omitted, and the passage be carried along to the outside of the brickwork, an air passage being constructed at an angle to it, and the pipe being enlarged at their junction. Through this air channel air at any temperature is blown by means of a fan-blower driven in any ordinary manner.

A modification of this arrangement is sometimes adopted, according to which the first mentioned bath, which in this instance is provided with a cover, is properly secured to the main cover-plate, in which are formed four apertures, two being placed at one end to allow the products of combustion to pass up into the chamber first mentioned, and two down which they are taken to the chimney flue. Within the bath is also placed the pyrometer, thus constructed:—An iron tube passes through the bath or hot chamber, and is secured at both ends so as not to allow the hot metal to pass, one end being closed. Into this closed end is screwed a tube of brass, copper, or other metal which is more expansive under heat than iron, and into the end of this tube again is screwed a rod of steel or iron, having its end turned up. Upon the tube is mounted a rack bar, provided with a spring to keep it tightly pressed down, so as to intermesh with a pinion, the spindle of which passes through the end of the screwed rod, and carries on its farther extremity a pointer moving with the pinion, and having its stem made of some material which does not conduct electricity. One end of the pointer is formed with springing piece of metal or other device, so as always to remain in contact with the face of a plate, to be presently described, and its inner end is arranged to receive two wires, the negative poles of two magnets. The dial, which may be either a solid disc or of any other suitable form, is mounted upon a sleeve, through which the spindle of the pinion runs, and which is secured firmly to the turned up end.

Upon any point of the circumference of the dial, and arranged so as to be completely isolated from it, is placed the plate above referred to (secured by a screw or in any usual manner), divided up into two parts by non-conducting material, each of these parts forming the end of the positive pole of a magnet. To the door of the blasts is secured a frame, in the upright part of which is formed a bearing for a shaft passing through the blast door, and carrying on its inner end a damper rotating with the shaft always in the same direction, and arranged to close either one of the apertures in the door which communicates with the upper and lower blast ports or flues. This shaft passes out beyond the frame, and is provided with a handle for the purpose of winding up on a drum mounted on the shaft, a line weighted at its free end. Upon this shaft is also secured an escapement rod, having one end bent so as to form a hook to engage with a corresponding hook formed on the end of an armature, to be presently referred to, the other end of this rod engaging with a corresponding projection formed on the armature. The engagement with the one or the other takes place according as the armature is influenced or not by electro-magnets, to be hereinafter referred to. This armature is secured to a projecting support attached to the frame of the door in such a manner as to allow it to turn, a corresponding armature being secured to it at right angles. Electro-magnets are provided, each connected with a suitable battery, the wires of their negative poles being taken to the pointed end of their positive poles to the split plate placed upon and isolated from the dial.

The passages along which the blast passes to the furnace are suitably formed, the under side of one being set at any angle, and formed by an iron plate, or in any suitable manner, so as to give a seat for the grate to rest in, and at the same time cut off all communication between the upper and lower blasts. Upon the shaft carried by the frame above referred to is placed loosely a toothed wheel, in the teeth of which works a double lever, like the escapement of a watch, pivotted at the end of a weighted rod, and upon the shaft is fixed a smaller ratchet, in the teeth of which works a pawl pivotted to the large wheel, and held in place by a spring, the whole arrangement being similar to that of an alarm clock; or any other equivalent device may be adopted for regulating the motion. The upper and lower blast flues are closed automatically by the rise and fall of the temperature of the furnace under the action of the apparatus hereinbefore described. In order to convert iron wire into steel the bath is filled with molten iron, there being placed in it, by preference, guides along which and through the metal the iron to be operated upon is drawn. The tube and rod above referred to are in this case omitted.

GOLD AND SILVER EXTRACTION.

The difficulties encountered in amalgamating refractory gold and silver ores is generally owing to the presence of base metals—iron, copper, lead, zinc, and antimony; and in roasting gold and silver ores of this class, as ordinarily conducted by the addition of common salt for the purpose of converting the silver to a chloride, the base metals are changed to the condition of sulphites, sulphates, oxides, and chlorides. While the oxides of iron, copper, zinc, &c., are not soluble in water, yet when they enter the pan or barrel in presence of metallic iron, and the undecomposed salt and sulphate of soda coming from the furnace, there is formed soluble iron, copper, zinc, lead, &c., which in presence of metallic iron are precipitated, and assist in sickening the mercury, and in the decomposition and loss of the same, and while a simple hot water leaching would remove the soluble chlorides and sulphates, yet the oxides will, as before stated, remain in the pulp, and do their proportionate share of harm. Experience has proven the fact that when the base metal salts are kept in solution, or are thoroughly and effectively removed from the roasted ore, the gold or silver amalgamate readily and completely; and as amalgamation is the most economical method known of gathering the gold and silver in a convenient form for reducing to metal, it is not a matter of surprise that so much time, money, and skill have been devoted to the object of amalgamating closely; that is to extract the noble metals to within a close per cent. of the ore contents by means of mercury.

The great object to be accomplished is to bring all the metallic salts to the state of chlorides, because all of them, except silver and mercury, are soluble. This conversion is very successfully accomplished by the new Stewart process, for it appears that the Hunt, Douglass, and Stewart bath of protochloride of iron and chloride of sodium when used in wooden vessels, and a temperature of 160° to 180° Fahr. (and with or without the use of sulphurous acid or fumes, according to the nature of the ore), acts upon the oxides of iron, copper, zinc, &c., converting them to soluble chlorides. The oxychloride and dichloride of copper, which are insoluble in water, are also attacked by the bath and rendered soluble. The chloride of lead, which is soluble in water, is also soluble in the bath. So that not only all the base metal salts which are soluble in water, but all those which are not are by the bath converted to soluble salts, and are held in solution during the amalgamation of the silver or gold, and are afterwards readily removed from the ore. Not only this advantage is gained, but the oxychloride and dichloride of copper, which are so destructive to the mercury, and a hindrance to the amalgamation of the gold and silver where water and metallic iron are used are by the use of the bath made to do good service, as the copper, salts, and mercury decompose the sulphides and sulphites of silver, and chloridise the same, increasing the yield of the silver above the furnace chlorination; also the copper is saved at an expense of a little more than the cost of old scrap-iron.

The roasted ore containing copper (either naturally or artificially mixed) if brought to the pans, and charged with a supply of the bath from the store tank, the pans being in motion, no water as in ordinary amalgamation is used. About two hours is allowed for heating and chlorodising; the mercury is then added, and in six hours the whole is discharged into the settler. If the pulp is not thin enough in the settler more of the bath liquor is added. In about seven hours the mercury and amalgam are drawn off and put into straining sacks, while the pulp and liquor are put into the filter tubs. From the filter tubs all the soluble base metals are filtered out by the addition of more bath liquor. Hot water is then added, which filters out the salt. The liquors from the filter tubs are conducted through tubs for precipitating the copper, &c., then to the evaporator and store tanks for use again, while the ore or pulp from the filter tubs, after being thus cleansed of copper, soluble base metals, and salt is discharged into the washing-pan for gathering the remaining mercury, and is then run into the creek as worthless.

The advantages of the process are that the chloride bath dissolves and holds in solution the base metals, while nothing but the silver and gold are precipitated by the metallic copper and mercury—hence the mercury is not decomposed or floured by the base metals, and a saving is thereby effected; also the silver and gold are nearly pure; and that when the liquor and pulp are discharged from the settler into the filter tub the base metals (including the copper) are filtered out, and also the chloride of sodium, all of which are saved by precipitation; the copper in its place, and the chloride of sodium, iron, zinc, &c., in their places, and these chlorides are used again for chlorodising fresh charges of ore, so that a close extraction of the silver, gold, and copper is obtained, the loss of mercury is reduced, and a great saving of salt is effected. The extra expense for labour over ordinary amalgamation will not exceed $1½ per ton of ore, which is compensated by the copper, salt, mercury, and additional amount of gold and silver obtained, sufficient in many cases to pay the whole expense of reduction as ordinarily conducted. The process has been used with gratifying results in America, and is being applied at other places.

IMPROVEMENTS IN DRILLING ROCKS.

The boring bit is, according to the invention of Mr. W. WEAVER, of Phœnixville, Pennsylvania, formed with a double cutting surface, thereby rendering it greatly superior to the ordinary single bit. This bit is fixed on to the end of the boring rod, which is mounted in bearings carried by cross-heads on the main frame. This frame is provided with three legs, two of them being extensions of the side bars of the main frame, and one being pin-jointed to the frame and extending from the back thereof. Each leg is capable of being extended or contracted to suit uneven ground. The drill rod or boring bar may be worked by hand or by power. When power is employed a frame is formed with or secured to the main frame, and on this frame is mounted a cylinder which will communicate motion to the driving shaft. The driving shaft is mounted in bearings carried by the main frame, and when driven by power has fixed thereon a single cam to raise the boring bar, but when driven by hand a double cam is fixed thereon, and a hand wheel is fixed on each end of the driving axis. Each cam has a stud or projection fixed to one side thereof. These studs are made removable, so that they can be changed in length according to the distance it is desired to turn the drill rod or boring bar. The bearings for the drill rod have one half thereof removeable, preferably hinged, to facilitate the ready withdrawal and replacement of the drill bar or boring rod. Through the upper ends of the two front legs or side bars of the main frame are a number of holes, made so that the upper cross-head can be adjusted up and down, so as to regulate the tension of the springs acting to give the required motion to the drill rod or boring bar. These springs are threaded around two rods, and act upon a moveable cross bar, which acts upon the upper side of a boss or clamp fixed to the boring bar or drill rod. The boring bar or drill rod is turned, raised, and fed downwards by a ratchet nut. This nut consists of a tubular body of any desired length, having ratchet teeth formed upon its lower end, and an opening in its side, which is closed by a friction clamp. Between this clamp and the drill rod is placed any suitable substance, which is held with sufficient frictional contact by the clamping screws against the rod, so that when the cam strikes against the underside of the nut to lift it upward the nut will lift the rod with it against the force of the springs. At the same time that the cam raises the nut and rod, the projection thereon catches in one of the teeth of the ratchet and partially turns the rod. As the nose of the cam passes from under the nut, after having raised it with the rod, the springs force the nut and rod back into position again with a quick motion, the nut striking with full force upon a padded stop. As this nut strikes the stop, and is thereby suddenly stopped in its downward movement, the frictional clamp allows the boring rod to slip through the nut the distance the bit on the end of the rod has cut, and thus the rod is raised, turned, and fed forward at each action of a cam. The hand-driving wheels at the ends of the driving shaft may also be used to run on roads to facilitate the moving of the machine from place to place. When it is desired to remove the drill bar from its bearings, and to place it again in position, the cross-head on which the springs act is pressed upwards, and there held by a suitable pivotted stop.

HYDRAULIC COAL-GETTING MACHINE.

In lieu of the wedges now used in the operation of wedging down coal Mr. JOSEPH MITCHELL, of Worsbro' Dale, Barnsley, proposes an expanding plug operated by hydraulic power. This plug in its contracted form is cylindrical, and is composed of two semi-cylindrical halves with a wedge-shaped space between them, formed by inclining their adjacent faces. These semi-cylinders are jointed at the end at which the wedge-shaped space is widest to the extremity of a hydraulic cylinder, and they receive between them a wedge-shaped extension of the hydraulic ram or plunger, fitting exactly the widest part of the wedge-shaped space, and extending about half its length when the ram is withdrawn into the hydraulic cylinder. When hydraulic pressure is applied to the ram, its wedge-like extension is driven farther along the space between the two halves of the plug which are forced apart, thereby expanding the plug beyond its original diameter in one direction. In using the apparatus, the coal having been undercut as usual, a hole is drilled in the face of the seam at the upper part, of a size and shape corresponding to that of the plug in its contracted or cylindrical form, so that the plug will exactly fit into the hole. In this hole the plug is inserted so that its expanding force will be exerted in a vertical direction, and the hydraulic power being applied the wedge-shaped extension of the ram is driven between the parts of the plug, thereby expanding the latter with immense force until the mass of coal beneath it is brought down. This expansion of the plug is greatest at the extremity which is most deeply inserted, and, therefore, in the position most favourable for bringing down a large mass of the coal. A number of these expanding plugs may be simultaneously applied if necessary, or the same plug may be inserted successively in different holes. The hydraulic power may be applied by an accumulator or other source of power in connection with the hydraulic cylinder, or the power may be generated within the cylinder itself, by the evolution of gases produced by the chemical combination of a suitable mixture placed within the cylinder, the expansive force of the gases being exerted on the liquid and by it transmitted to the ram; suitable means are employed for determining the chemical combination of the charge according to its nature. In either case the workmen are enabled to retire to a safe distance before the fall of the coal, and thus avoid the accidents which frequently occur in the ordinary method of wedging down coal.

MANUFACTURE OF PORTLAND CEMENT.

An important improvement in the manufacture of portland cement has been patented by Messrs. WHITE, of Swanscombe, by which a better quality of material is obtained and the cost of manufacture is considerably reduced. For this purpose they take chalk and clay in the natural state in which they are found, and without the admixture of water they obtain an intimate mixture of these materials by placing them together into a hopper, from which they pass to a series of pairs of crushing rollers. The materials as they leave the hopper have first to pass through a pair or pairs of fluted crushing rollers, from which they pass to other pairs of plain rollers, placed closer and closer together, and running at increased surface speeds. By this means the materials are reduced to a thin sheet, the chalk within which is in a thoroughly disintegrated state and mixed with the clay. After the materials have thus been crushed and mixed together by means of rollers they may be moulded into bricks to be burnt in any ordinary manner, no fuel being mixed up with the materials of which the cement is composed.

The number of pairs of rollers in the mixing machine may be varied, but they prefer five, and the relative dimensions and speed of the rollers may also be varied. In the most convenient arrangement of machine there is a hopper at the top, into which they feed the materials, chalk, and clay in proper proportions and in the raw state in which they are obtained. The materials descend from the hopper to a pair of horizontal rollers fluted longitudinally. These rollers are (say) about 12 in in diameter at the points of the flutes, and are adjusted to work at 13 in. apart from centre to centre and to make about 10½ revolutions a minute. From these rollers the materials descend by preference to a second pair of fluted rollers of about the same diameter placed closer together—say, about 11½ in. from centre to centre, and making about 24 revolutions a minute. From these the materials drop to a pair of smooth rollers about 1 ft. 3 in. in diameter, 3-16 in. apart, and making (say) 39 revolutions a minute. From these again to another pair of rollers placed still closer together—say about 3-32 in. apart, 1 ft. 9 in. in diameter, and driven at about 58 revolutions per minute. All the above rollers we have made 3 ft. long. From the last-mentioned rollers the materials drop to another pair placed still closer—say about 1-32 in. apart, 2 ft. 3 in. in diameter, and driven at still greater surface speed—say 88 revolutions per minute; they are also set at right angles to the other rollers and are made about 4 ft. 6 in. long. The stream of materials descending on to these rollers from the rollers above them becomes doubled or gathered together, and is thereby intimately mixed together. A very perfect mixing of the materials may, however, be obtained even if the last pair of rollers are placed in a line with the other rollers and not at right angles to them. A scraper is by means of a weight or spring, or any other suitable method, held up to the under side of each of the several rollers to prevent the material being carried round with them, and at the ends of the spaces between the several pairs of rollers there are end plates which prevent the material from escaping and compel it to pass downwards between the rollers.

The several rollers are geared together by toothed wheels at their ends, so that they shall revolve together at the required speeds, and be driven by a belt wheel on the axis of one of the rollers. The lowest pair of rollers may be driven by a separate belt and belt wheel or ordinary gearing. The materials having thus been mixed together in the machine are afterwards moulded into bricks or blocks to be burnt. They prefer to use for this purpose that class of machine in which the materials are fed by rollers into a box across the bottom of which a series of moulds formed in a revolving table are caused to pass in succession; the moulds are filled as they pass below the filling-box, and are emptied after passing beyond the box, but other machines for moulding bricks or blocks may be used for the purpose. All that is required is that the machine should perform its work quickly, no perfect moulding of the bricks being required so long as they are about the same size, and will hold together to allow of their being stacked in a kiln.

It will be seen that by the hereinbefore described process of making cement the ordinary addition of water to the materials is entirely dispensed with, and consequently the tedious and costly processes of draining and driving off the water which has been so added is done away with, a result which has before been aimed at, but not attained.

OBTAINING ALUMINIUM.—Lead or a sulphide of lead, or a mixtuer of the two, are, according to the invention of Mr. E. A. WILDE, of Notting Hill, melted, and in a melted condition are poured upon dried or burnt alum. The crucible in which they are contained is then placed in a furnace, and heated together with suitable fluxes. The metal when poured out of the crucible will be found to be mixed with aluminium. The aluminium and lead can either be subsequently separated the one from the other by any known means, or the alloy or mixture of the metals can be employed for various useful purposes for which pure lead is more or less unsuited.

MANUFACTURE OF SULPHURIC ACID.

The apparatus for the manufacture of concentrated sulphuric acid and other mineral acids, invented by Mr. L. BRUMLEU, of Berlin, consists mainly of a burner wherein brimstone or other sulphur-containing mineral is burned, of several vessels or chambers of any size or shape connected with the burner by means of pipes, and of an air pump or blower. The burner may be the same as used in the manufacture of sulphuric acid for the purpose of the burning of brimstone or other minerals containing sulphur. At a suitable distance above the burning brimstone is a vessel of iron or other material, placed so that it is reached by the flame or heat of the burning material, and its contents become heated by the same. This vessel is filled with nitric acid or any other salts of nitre, with a due proportion of sulphuric acid, so that nitric acid is produced. At the side a small pipe of iron or other material is entered through the wall of the burner above the burning material, through which pipe a small stream of steam can be blown into the inside of the burner, just above the burning materials. From this burner, some distance above the burning brimstone, a pipe of a pretty large dimension is led through the back wall of the burner till within a short distance from the bottom of the first vessel or chamber, being passed through the top of this chamber. A damper is placed so that this tube can be closed inside the burner as occasion requires. The first vessel, or chamber, may be of any shape, the size being regulated in proportion to the quantity of sulphur to be burned and the size of the burner. By preference this chamber is constructed of brickwork, narrow, low, and long, for reasons which will appear afterwards. It may be 12 to 20 ft. long, 4 to 5 ft. wide, and 2 ft. high, inside clear of the wall. The sole of the chamber must be of cast-iron plates, with a fire-place under it to heat the contents of the chamber. According to the nature of the acid to be made the inside of this chamber must be lined with lead as far as up to the doors, or it may remain free from any lining, so that the sides and top are coated with cement and the sole of iron. This chamber is divided in different compartments by either glass plates or iron plates, according to requirement, cased in sheet lead, these divisions reaching only from the top of the chamber to about its middle, leaving the lower half of the chamber undivided. Each of these divided compartments is on one side provided with an opening so arranged that it can easily be closed by a sliding door of glass or otherwise. These slides or shutters must have a small hole just barely large enough to pass the iron handle of a rake through for the purpose of stirring up or raking the contents of the chamber without opening the doors. Besides the pipe or tube connecting the chamber with the burner there is another pipe carried through the top of the chamber to within a few inches of the sole of the chamber, this pipe is connected with an apparatus where air is heated in any way it may suit best, and also provided with a damper. This first chamber is connected with a second chamber of about the same dimension and size by a pipe coming out from the top of the first chamber, going through the top of the second chamber to within a short distance from the sole or bottom of the same. This chamber is also divided into several compartments, with this difference, that the partitions of the second chamber go from top to bottom, forming thereby several separated smaller compartments, all connected through pipes going from the upper part of the first partition to within a short distance of the sole or bottom of the next, and so forth from the second to the third, and so on to the last compartment. This second chamber must be placed so much higher than the first one as to permit its liquid contents to run through the intermediate compartments into the first chamber. For this purpose all the chambers or compartments are connected by pipes of lead, glass, or any other suitable material, and these pipes are provided with cocks, so that they can be opened or shut as the case may require; these pipes going from the bottom of one partition to the bottom of the next one, the contents of all the partitions can be run into the first chamber. These small compartments require no lining, but only a coating of cement; openings or doors are not absolutely required, but may be useful for the purpose of inspecting the chamber and for repairs, and have to be so arranged that they can be luted air-tight. From the top of the last compartment a pipe connects the whole chamber system with an air pump, blower, or other instrument suitable for sucking the air from the chamber.

When the apparatus is thus arranged it is ready for use. If it is to be employed for making sulphuric acid the chambers are kept dry and empty—that is no water is put in. The brimstone in the burner is then ignited, and when it is fairly burning and nitric acid provided in the vessel for that purpose, the blower is put in motion and the steam pipe is opened to let in a stream of steam. By the suction of the blower the sulphurous acid, the steam, and the nitric acid vapour will be drawn through the tube into the first chamber, and there, the chamber being kept cold, condensing drop down in a liquid form as sulphuric acid. To assist this dropping down and regulate the speed of passage through the whole chamber system half partitions are constructed as described. In the first chamber the strongest acid is produced, whereas the mostly exhausted vapours in passing through the smaller chambers have only a very weak acid in small quantities, and finally pass out through the blower completely exhausted. During this stage of the process the cocks of the connecting pipes are kept open, so that all the weak acid which is precipitated in the compartments may run back into the first chamber.

The velocity and size of the blower or air pump must be regulated so that all the sulphurous acid, steam, &c., is drawn from the burner into the chamber. If the pump is too small or is worked too slowly sulphurous acid will escape through the door or air-holes of the burner, if too large or worked too quickly the draught will be too quick, and the vapours hurried too quickly through the chambers and not be able to discharge all the sulphuric acid which is contained in them. The quantity of steam can be regulated in such a way that the acid in the chamber is about 40° Beaumé strong to avoid useless condensing afterwards. When in this way the first chamber is filled about half or up to the door, or as high as the lining of lead will admit, the act of concentrating begins and is continued till the acid has acquired strength of 66° Beaumé or more. To obtain this object fire is made under the first chamber, the tube connected with the burner closed, and instead of that the tube connected with the hot-air furnace opened, and the cocks of the pipes closed which connect the different chambers. The blower or air-pump now put in motion draws the hot air quite through the weak and hot acid, and in so doing dissolves water and some acid in its passage, which is carried off with the air through all the small chambers, where, these being kept cold, the weak acid will be condensed and collect at the bottom of the chamber. The passing of hot air through the hot acid will not alone be the means of concentrating the acid by the passage of the air through the acid; it will be kept in a state of motion just as is produced by the boiling of a liquid, and a strong evaporation of water and acid takes place, which by the draught of the blower is drawn into the small cold chambers and there condensed. As soon as the required strength is obtained the acid may be drawn off by a syphon or a pipe left for this purpose in the chamber into a cooling vessel, or left in the apparatus to cool there, just as it may be convenient. To keep up a perpetual process each burner ought to connect with two sets of chambers, so that one makes weak acid during the same time that the other concentrates.

In applying the invention to the manufacture of chloride of lime or bleaching powder, the required ingredients are brought into the first chamber, and the process carried on the same way as for making sulphuric acid; the sulphuric acid formed then will, being condensed, drop down on the ingredients, decompose them, and make the chlor gas free, which in passing through the chambers will there deposit the moisture which it contained, and may then by the air pump or blower be conveyed through pipes to the rooms where lime is spread out to take the gas up and form bleaching powders. In the beginning of the process no fire is required until the contents of the chambers are nearly decomposed, when heat has to be applied to forward the process, and drive off all the gas by fire under the chamber as well as by the influx of hot air. When all the salts are decomposed the influx of sulphuric acid from the burner has to be stopped, and the fire as well as the influx of hot air continued till all or nearly all the chlor gas is driven off. During all the time the contents of the chamber have to be stirred up and raked up by means of iron rakes, the handles of which are passed through the small holes left for this purpose in the doors. Of course the doors have to be made tight as much as possible, and luted to prevent the escape of gas and the entering of cold air.

To decompose salt for the purpose of getting the sulphate of soda and hydrochloric acid, the first chamber is filled with salt, and the small chamber with water up to the door of the chamber, and then the process is carried on as described by sulphuric acid. The water in the small chambers will take up the gas which is created by the decomposition of the salt, and form thereby hydrochloric acid, whereas the salt is turned into sulphate of soda. When all, or nearly all, the salt is decomposed fire is made under the chamber, and even with the assistance of hot air the whole mass is raked and stirred up by the rakes till all the gas is driven off just as is always done now in making this article. For works were much carbonic acid is used for the purpose of making bicarbonate of soda, the last chamber may be provided with a stirrer or agitator, and then filled with water and chalk or marble dust, the stirrer being kept in motion, and the gas being drawn through the chalk will be decomposed to muriate of lime, while carbonic acid getting free may be forced by the blower into the room where soda is arranged in the usual way to be transformed into bicarbonate of soda.

REGISTERING THE GAUGE OF RAILWAYS.

For controlling and graphically registering the width between the rails of railways, Mr. J. HOCHGRASSL, assistant engineer of the European Turkish Railways, of Usun Kopri, near Constantinople, proposes an apparatus which is by preference fastened to a trolley, and works automatically during the course of the same with great accuracy. The apparatus has two wheels of cast-iron provided with flanges. These wheels move with their axles each in two sockets rivetted on an L iron, which is fastened on the said trolley by means of a pole. One wheel is by a projecting piece of the axle and by a pin with a retaining plate held in its place, whilst another wheel by means of the spiral spring slides to and fro according to the width between the rails. In the middle of the horizontal L iron is mounted a T-shaped support on which rests the registering apparatus and writing instrument. The whole frame is by means of small chains suspended on two flat springs which project from the trolley whereon they are fastened. The suspension is effected in such a manner that the stationary wheel is always pressed against the rail, whilst the other wheel moves on the rail almost without any friction.

The sliding of the movable wheel corresponds to the actual width between the rails, and is communicated to the writing pen by means of a lever turning round its point. This lever is forked, and is placed with its forked end in a groove of the movable shaft. Between the writing pen and a metal plate moves a paper strap or band. This strap is moved forward by passing between drums, one of which is turned by means of small wheels and an eccentric. The rolling of the paper strap on the cylinder is effected by means of another wheel; the axle of one wheel has a conical end. On this axle is a cylinder which by means of a screw or screws is pressed in such a manner that the said cylinder can slide on the axle according to the increasing diameter of the paper roll. A drum provided with rows of small pins draws on the paper strap by two parallel dotted lines the normal width between the rails, whilst the deviations from the normal width are drawn by a single line. The beginnings of curves and the like can easily be marked on the paper band by the attendant on the trolley. The aforesaid pressure screws have for their purpose to regulate the rotation of the said cylinder and drum.

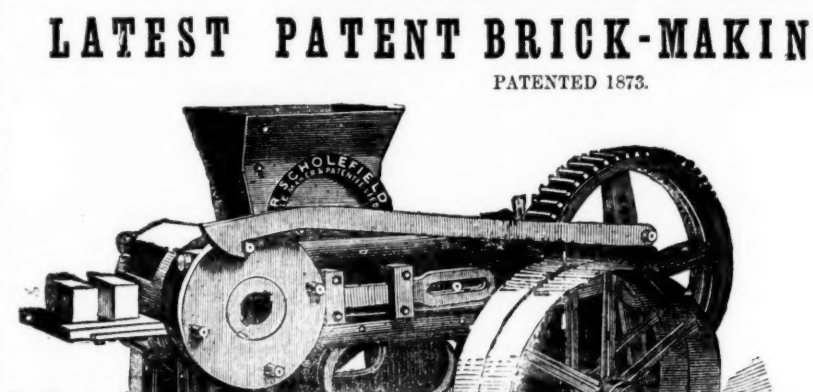
The rotating valve has two radial grooves next to the shifting valve, and one circular groove on its back face. Of the two radial grooves one communicates with a hollow cavity in the centre of the valve where steam is first admitted, and from whence it is supplied through the said radial groove to the shifting valve; the other groove occupies about two-thirds of the opposite radius, and is carried through the thickness of the valve to the circular groove at the back, which groove is in constant communication with the exhaust pipe. The admission of steam to the centre cavity of the rotating valve is so made that this valve is kept pressed between the shifting valve and the exhaust face, thereby preventing leakage on either face. The amount of such pressure can be regulated so as to produce almost an equilibrium. Both the valves are contained in a steam-chest, and can be made in the form of two cylinders placed on end, and having their axis in a line with that of the crank shaft at one end of the latter, or of two concentric cylinders, one within the other, or of concentric cones, one within the other; or the shifting valve may be made in the form of a circular plate with chambers cast round its centre, corresponding in number with that of the cylinders, and containing slide valves all worked by the same eccentric or crank fixed on the crank shaft, which is prolonged through the said plate or shifting valve; or the steam-chest itself may be made to act as a shifting valve, provided it be connected with the body of the engine by means of a trunnion joint to allow of shifting without leakage. In all the above or in other suitable forms of the valves it is to be observed as a prominent feature of his invention that the steam-valve proper does not supply steam directly from the steam-chest, but that the steam is first passed through the shifting valve.

A lot of 16 tons of ore recently arrived from the Silver King Mine, Arizona, was sold for $2449 per ton.

HOLLOWAY'S OINTMENT AND PILLS.—In angry and indolent sores, and all skin diseases, originating in impure or weak blood, or depraved secretions, the joint agency of Holloway's Pills and Ointment is perfectly irresistible. It is of little consequence how long these disorders may have lasted, or how sluggish, obstinate, or maglignant they may seem; the daily application of the Ointment to the parts afflicted, and a course of these matchless Pills, will most certainly effect a cure; not temporary or superficial, but complete and permanent. Both the Ointment and Pills are composed of rare balsam unmixed with mercury or any other deleterious substances. They are, accordingly, as mild and safe as they are powerful and efficacious.

R. SCHOLEFIELD'S
LATEST PATENT BRICK-MAKING MACHINE.

PATENTED 1873.



R. S. begs to call the attention of all Colliery Owners in particular to his PATENT SEMI-DRY BRICK MACHINE, and the economical method of making bricks by his patent machinery from the refuse that is taken from the pits during the process of coal-getting, which, instead of storing at the pit's mouth (and making acres of valuable land useless), is at once made into bricks, at a very small cost, by R. S.'s Patent Brick-making Machinery. If the material is got from the pit hill, the following is about the cost of production, and the hands required to make 10,000 pressed bricks per day:—

2 men digging, each 4s. per day	£0 8 0
1 man grinding, 4s. 6d. per day	0 4 6
1 boy taking off bricks from machine, and placing them in barrow ready for the kiln, 2s. per day	0 2 0
1 boy greasing, 1s. 6d. per day	0 1 6
1 engine-man, 5s. per day	0 5 0
1 man wheeling bricks from machine to kiln, 4s. per day	0 4 0
Total cost of making 10,000 pressed bricks	£1 5 0, or 2s. 6d. per 1000.

(SETTING AND BURNING SAME PRICE AS HAND-MADE BRICKS.)

N.B.—Where the material can be used as it comes from the pit, the cost will be reduced in digging.
As the above Machinery is particularly adapted for the using up of shale, bind, &c., it will be to the advantage of all Colliery Owners to adopt the use of the said Brick-making Machinery.

THE MACHINES CAN BE SEEN IN OPERATION AT THE WORKS OF THE SOLE MAKER AND PATENTEE DAILY.

SCHOLEFIELD'S ENGINEERING & PATENT BRICK MACHINE WORKS,
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British and Foreign Safety Fuse Company,

REDRUTH, CORNWALL,

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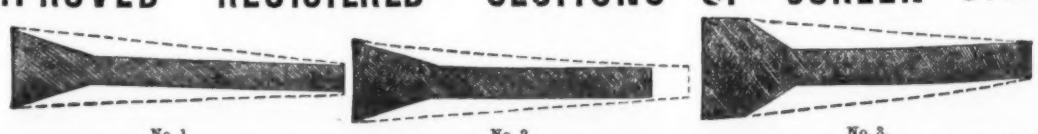

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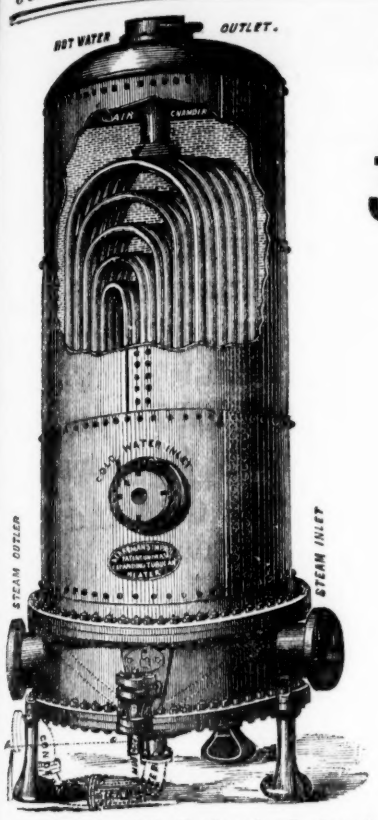
THE DOTTED LINES SHOW THE ORDINARY SECTION, AND THE DARK GROUND THE IMPROVED SECTIONS.—A saving of at least 30 per cent. is effected by the great reduction in weight of material.—For price and particulars apply to—

JOEL EATON WALKER, STEEL MERCHANT, SHEFFIELD.

NOTICE.—These Sections are Registered.



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JOSEPH WRIGHT AND CO.

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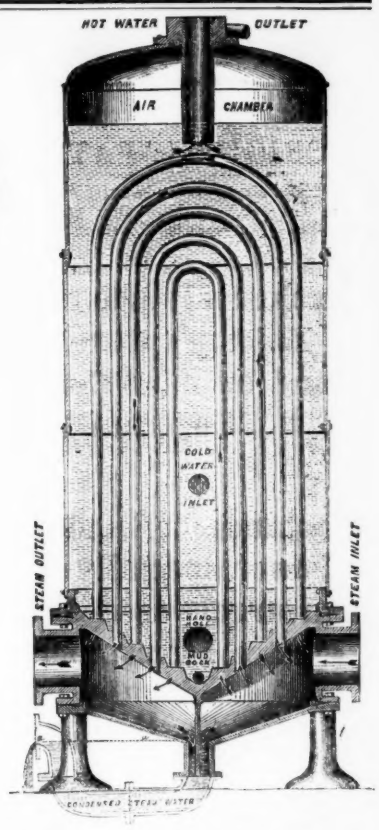
NEPTUNE FORGE ENGINE AND BOILER WORKS,

TIPTON, STAFFORDSHIRE,



Having purchased the Engineering Business lately carried on by R. BERRYMAN AND CO., at 23, Congreve-street, Birmingham, and 28, Wilson-street, Finsbury-square, London, have removed the whole to their Works at TIPTON, to which place ALL COMMUNICATIONS SHOULD IN FUTURE BE ADDRESSED, and where the BERRYMAN HEATER can be seen at work, and in every stage of manufacture.

Being the SOLE MAKERS and PATENTEES of these CELEBRATED COAL SAVERS and EXHAUST STEAM UTILISERS, and having remodelled and greatly improved them, adding largely to their HEATING SURFACE and WATER CAPACITY, J. W. and Co. have put down a special plant, which includes an entire new set of improved patterns, enabling them to offer these FEED WATER HEATERS to the public at

GREATLY REDUCED PRICES.

This arrangement of BRASS TUBES of a great length giving an enormous HEATING SURFACE makes this HEATER not only the MOST POWERFUL ever invented, but its FIRST COST PER FOOT OF HEATING SURFACE IS LESS THAN HALF THAT OF ANY OTHER. It will condense the whole of the Exhaust Steam from the Engine if required, and entirely does away with the NOISE and BACK PRESSURE from exhaust pipes.

ALL THE TUBES ARE OF SPECIALLY PREPARED SOLID DRAWN BRASS AND COPPER; both ends are expanded into the bored holes of the same Tube Plate, METAL to METAL, and every tube is free to expand and contract independent of each other. Leakage is impossible, as, when the tubes are once fixed, nothing short of cutting out will remove them. No scurf adheres to the tubes because of the difference of expansion between SCURF and BRASS. The inside of the Heater can be washed out by means of the mud cock and hand hole whilst at work.

Only one pump or injector is required, and as the Heater is placed between the pump and the boiler, the water is forced, COLD, into it, and passes out at the top HOT into the boiler direct. Where the WATER WORKS PRESSURE is sufficient no pump or injector is needed.

The water being heated to BOILING POINT UNDER PRESSURE in the Heater, a saving of from 20 per cent. to 25 per cent. in fuel is effected; the disastrous results of grease in boilers are also avoided, the sewage and other loose matter in the water being deposited in the Heater, the acids are liberated there instead of in the boiler.

Every part can be lined with BRASS, COPPER, or LEAD, as may be required in special cases for heating water or any kind of liquor in large quantities for CHEMICAL WORKS, BATHS, WASH-HOUSES, AQUARIA, GREENHOUSES, BREWERIES, WOOL WASHING, DYE WORKS, TANNERIES, &c., &c.; they will also HEAT AIR FOR CUPOLAS AND BLAST FURNACES, and are now at work as INTERHEATERS for compound engines with direct steam from the boiler with a further saving of 15 per cent.

The New Price List, with detail information, is now ready, and will be sent on application, together with an Illustrated Catalogue, with references and testimonials from Firms using TWO HUNDRED AND THIRTY-THREE of these Heaters.

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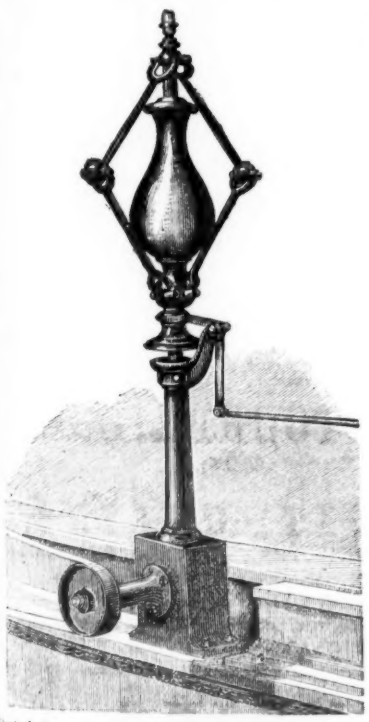

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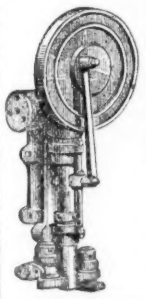

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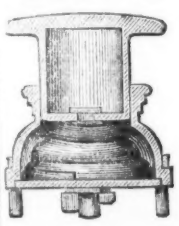

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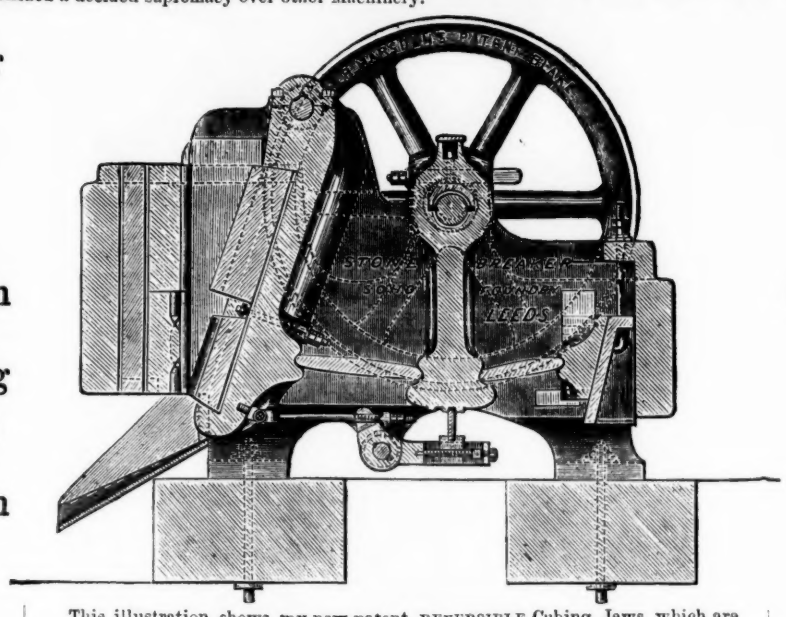

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